THE TRADE REVIEW

AND WESTERN MACHINIST.

WEEKLY EDITION, Vol. XVI—No. 40. } CLEVELAND, O., OCTOBER 6, 1883. { MONTHLY EDITION Vol. I.—No. 10.

The Engine Room.

The Van Dyke Water Tube Boiler.

The engraving presented with this represents a new water tube boiler now being manufactured by Broad & Ewer, at the Progressive Iron Works, Greenpoint, L. I., which has some features worthy the consideration of those interested in such matters. The water tubes are in rows transversely and vertically extending over the furnace at the front end and in number corresponding to the amount of heating surface required. They are plain tubes set in the ordinary manner, in headers at the front and rear, the headers being provided with removable bolted plates so that the tubes can at any time be readily come at for inspection or for cleaning, or if necessary at any time a tube can be removed and another substituted with even greater ease than in the instance of an ordinary tubular boiler.

The heat from the furnace is prevented from passing directly up and to the flue by means of fire-plates, which are so located as to compel the gases to traverse the length of each section of tubes in alternate directions until they reach the top, where they pass over the dome, thus superheating the steam in some degree. This provides a long run in a boiler of only moderate length, the hot gases being at all times in intimate contact with excellent heating surface.

Two hollow standards or columns extend from the ground to the shell or steam drum, the interior of these columns being connected with this drum by means of a cross-pipe which is flanged and riveted to it. These standards connect with the lower headers, but with none of the others, and at the other end of the boiler the top header is flanged to the drum. The feed water is pumped into the standards at the top, and by its superior gravity finds its way to the bottom, where it enters the lower header and the lower section of tubes, receives heat and rises by passing in turn through each section of tubes and enters the dome, in which the water is usually carried to about the center. Here the steam is separated, the water continuing in circulation through the dome, columns and pipes. Below the lower headers, the columns not being exposed to heat, the water in them is still, permitting the sediment to settle, when it is blown out by a blow-off located in the bottom of each, or removed in cleaning.

This would seem to provide for a rapid circulation of water through the tubes, which would prevent the deposition of sediment in them, and at the same time present a constantly changing volume of water to the action of the hot products of combustion.

The boiler is, as will be seen, simple in construction, is accessible in all its parts, and requires but little skill to erect. We are informed that by actual test, one of these boilers has evaporated 12.44 of water per pound of combustible, the steam showing superheat of from 10 to 16 degrees.

There are no joints exposed to the action of the fire, nor large surfaces exposed to bursting pressure. The location of the heating surface is such that it should be be effective, and the construction and setting such that the cost per horse power should be moderate.

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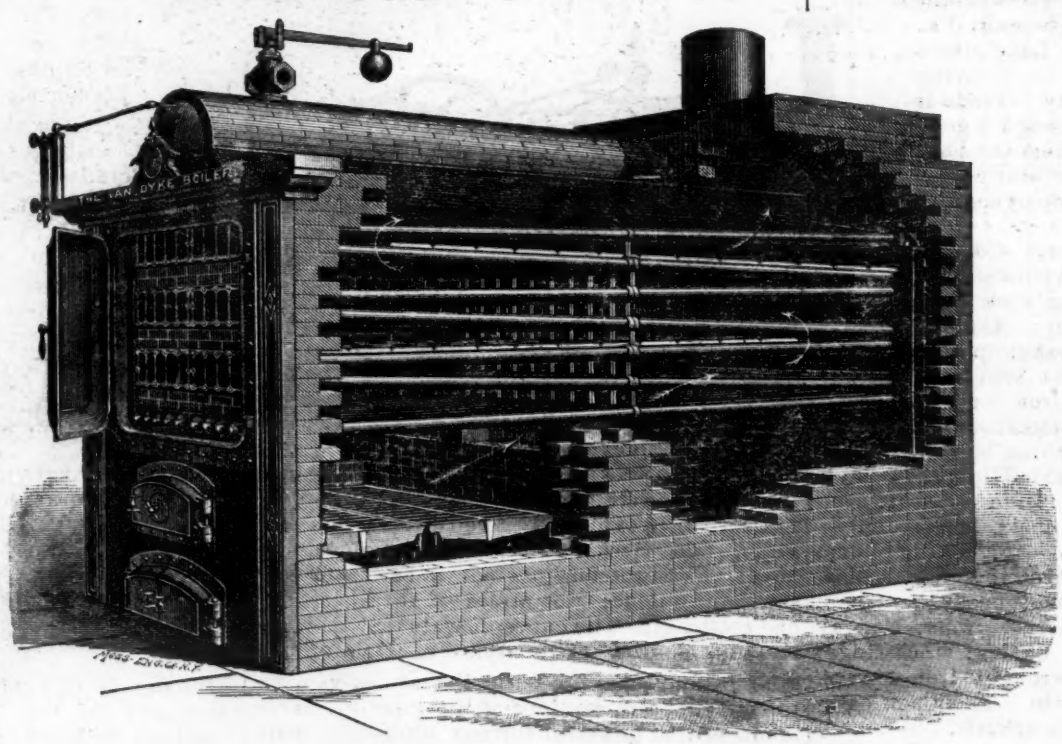

THE VAN DYKE WATER TUBE BOILERS.

The Most Economical Steam Engine.

In the design of an engine, which is to develop a desired amount of horse-power for the least current money expense, or for a given current expense is to develop the greatest horse-power, it will be found advantageous, other things being equal, to use high steam pressures and high rates of revolution.

The advantage of high steam pressure rests mainly on the ground that the horse-power represented by the back pressure forms a smaller per centage of the total power developed, as the initial pressure is increased.

The resistance or back pressure remaining, in any special engine, almost a constant unit per square inch of piston area, as the initial pressure is increased there is more power developed in the engine; the expense for the steam proper does not increase in direct proportion to the increase of its potential energy, while the effect of the constant elements of interest, repairs and depreciation of the engine, as compared with the power developed, will be to reduce the cost per horse-power.

Or, taking the other view, a smaller engine can be used to develop a given horse-power, and thus the portion of the expense, represented by interest, repairs and depreciation of engine, will be reduced, decreasing the cost of the horse-power developed.

There are of course objections to the use of abnormally high pressures. One is on the score of extra wear and tear, which adds to the depreciation account and to the expense of the horse-power, but this addition does not practically take place at the rate of decrease of interest, and as far as effect of cost of plant on power developed is concerned, it is decidedly in favor of high pressures.

When steam pressures rise as high as 250 pounds, or a temperature of 401 deg. Fahr., it may, as Mr. Seaton remarks, seriously affect the condition of the metals with which it comes in contact, ordinary unguents are vaporized, ordinary vegetable packing for the stuffing-boxes of the rods char and burn and like difficulties of a practical character must be met. However, as Mr. Seaton fails to state, these objections are by no means insuperable, as both the practice and experience of Perkins plainly show.

The advantages of high rates of revolution are twofold.

By using them the horse-power is developed for a less steam consumption, and consequently less current cost of fuel and boiler plant. Less time being accorded to the steam to impart heat to the metal of the cylinder, during admission, and to abstract heat from the sides, heads and piston during exhaust, the condensation of steam in admission and during expansion will be less, and especially—which is the important point—will less heat be uselessly abstracted for re-evaporation of water of condensation during exhaust. Therefore the steam and fuel consumption will be less per useful horse-power developed.

Again, in any given engine, an increase in the number of revolutions is synonymous with a development of more power, and consequently the interest, repairs and depreciation of engine per horse-power developed will be less.

Or, if a given power is to be developed a smaller and less expensive engine can be employed, and the interest, depreciation and repairs account thus diminished.

But practically the higher rate of revolution implies extra wear and tear, so that this affects the three accounts spoken of, but not to the extent sometimes imagined.

The experience of Mr. Porter's engine at the Edison Central Electric Station in New York is often mentioned as an example of the danger of too great increase in rate of revolution; but those who had occaaion to look into this matter closely, and to know the true causes which at the time prevented their successful operation, and who now know the sentiment relative to those engines which exists at the Central station at the present time, will not accept this experience as any proof against the useof the high rate of revolution then adopted.

We have had occasion to look closely into the effect of high steam pressures and high rates of revolution upon the economical development of power; have carefully compared the results of experience and money costs in new designs; and taking all in all high steam pressures and revolutions are factors theuse of which tend to insure the most economical development of power in steam engines. We are led to conclude, too, that as they have been directions of progress in steam engineering in the near past, they will continue so in the future.

We have repeatedly called attention to the advantages of superheating. Superheating prevents condensation in cylinder and consequent waste, same as do high rates of revolution. The expense of superheating is light both in fuel and in apparatus, while there is not the objection of wear and tear which still adhere to high rate of revolution. Moderate ratios of expansion, which economy dictates, do not necessitate a high degree of superheating, and consequently there should be no serious trouble in a practical way from the temperatures employed. In this connection the work of Mr. George Basil Dixwell, of Boston, Mass., should be studied more closely than it has been by experimenters, designers and steam-users.—[American Engineer.

Steel Rails.

A manufacturing engineer writes to La Metallurgie, Paris, claiming that the success of rolling steel rails depends on the temperature at which the steel is rolled. He states from his own experience that bars which were finished at a bright red heat (and which were recognized after cooling by their blue tint) were more fragile under tests by striking or flexion than those finished at a lowe temperature.

Manufactures.

CLEVELAND.

THE rail mill of the Cleveland Rolling Mill Co. started up last Tuesday.

IT is said that there are 5,800 men on the pay-roll of the Cleveland Rolling Mill Co.

THE Star Tool Co. has brought suit against M. G. Watterson, assignee of Silas Merchant, to replevin machinery valued at $1,200 and for $300 damages.

THE Brown Manufacturing Co. last Monday recovered two judgments against the Sayles & Anderson Manufacturing Co., aggregating $4,830.84, by default.

THE blast furnace was stopped on Wednesday morning to clean flues, and during its stoppage some part of the hot blast fell in, necessitating a stoppage of 36 hours more for repairs. The furnace started up again on Thursday night.—[South Cleveland Advocate.

THE Cleveland Electric Motor Co., is the title of a new enterprise just taken hold of by prominent business men of this city. The motor to be manufactured is the patent of Mr. L. W. Stockwell, of this city. A power of from one to four H. P. is obtained. We will refer more in detail to this motor hereafter.

UNDER the management of Mr. W. L. Hurd, who had ten years experience with the National Tube Co., of McKeesport, Pa., before coming here, the Lake Shore Tube Works, of this city, are enjoying a fair amount of prosperity. Trade is principally in the West, though a good amount of orders comes from the East as well. The works were started the present year and give employment to 140 men.

THE Cleveland Hardware Co. are rapidly extending their various lines of manufactures. Among their specialties are the following: Collins' wrought iron wagon brake; patent wagon box rods; wrought iron seat spring hooks; wrought iron lockpin clevis and clip for double-trees; wagon box strap bolts; wrought iron bolster plates; hammer straps; axle clips; new style pole cap and hold-back: side braces; king bolts; reach pins; stay chain bolts; double-tree plates; wagon box staples; coupling plates; patent circle posts; finished wagon and plow singletrees; singletree irons; neckyoke irons; wagon brake ratchets; corner irons; Norway iron wagon rivets; wagon chains; stock rings; coach and lag screws; wrought iron shears, with punch attachment, etc. Their new catalogue is as complete as it is artistic.

OHIO.

THE Girard Stove Works received another large order for car axles the past week.

THE new furnace of Means, Kyle & Co., at Hanging Rock, will probably be ready for blast by the first of next year. The stock is 65 feet high by 16 feet bosh.

THE Burton (Geauga County) Handle Co. have moved their machinery to the Novelty Works, and the new firm, Brown & Collins, have taken possession.

THE Lagonda Agricultural Works, Springfield, have ordered a Blakeney cupola furnace of 30 to 35 tons capacity, after using a furnace of the same patent of 15 tons for the past seven years.

THE Smith Bridge Co. in Toledo, has taken the contract for the bridge over Rifle River in Michigan, on the new Detroit, Bay City & Alpena road. The bridge will have one span of 150 ft. and one of 100 ft., and will be 70 ft. above the river.

Ironton *Register*, 20th: "The Union Iron Co., owing to the depressed condition of the iron business, have been compelled to ask an extension of their indebtedness, and to secure the same have executed a deed of trust upon their real estate, Washington and Monroe furnaces."

THE Whitney Machine Works in this place is crowded with business, four men being employed. More will be put on as fast as additional machinery is received. This is a far greater acquisition to Chagrin's industries

Continued on Page 7.

LOUISVILLE EXPOSITION FEATURES.

The Farquaher-Oldham and Frick & Co. Exhibits.

SPECIAL CORRESPONDENCE.

EXPOSITION BUILDINGS, LOUISVILLE, KY., Oct. 2.—The Farquaher-Oldham Filter Co., of New York, have a fine exhibit of filters on large and small scale that will do a continuous, rapid and perfect filtration for all kinds of manufacturers using water or liquids of any kind. By reason of the durability of the machine itself as well as its simple working process, it is superior to any thing ever brought out in that line. The household filters can be supplied by bucket or hydrant to suit the users.

The large machines vary in size and capacity from 500 gallons an hour to 1,000,000 per day, according to size used. Water which can be seen going in turbid, tainted, dirty, is drawn from the filter in a limpid, colorless state and free from all smells.

The invention on the face of it is really superior to any yet made in the filter line. Some of these filters may be seen in operation in Machinery Hall.

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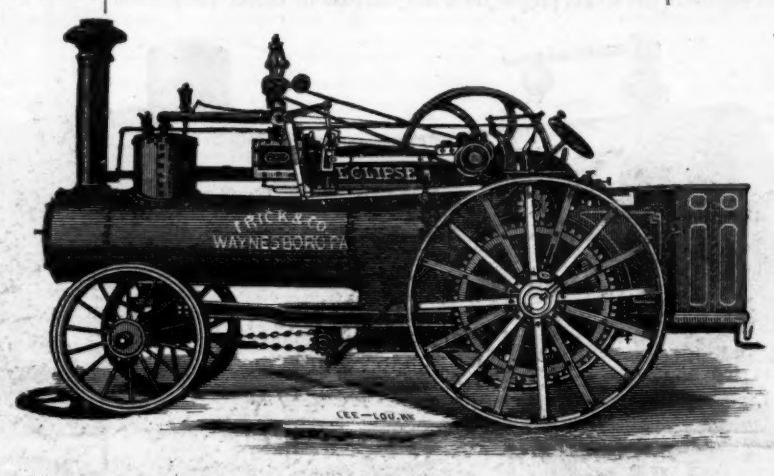
Prominent among the many and varied exhibits in Machinery Hall we find the display of Messrs. Frick & Co. of Waynesboro, Pa., who carried off the honors and first award, $100.00 in gold, at the St. Louis fair last year at which time there were fourteen competitors.



They have exhibited here two traction engines, (two sizes); two portable engines, one 25 H. P., stationary engine; a saw mill and saw mill engine; two styles of threshers, and one cotton gin. The cut represents the "Eclipse" traction engine. Two styles of traction engine in four sizes are built, the styles varying to suit different sections of the country. One is ma e with powerful springs under the main or driving axle, in connection with a universan coupling in the countershaft to allow for rock y and neven roads; the other without thes springs, and flexible countershaft for flat or prai iecountry.

The power in all cases is transmitted from the engine to the traction wheels through an elastic spring connection and compensating gear, which allows one traction wheel to rise vertically without straining the gearing and connections, and by a locking device in the hub of one traction wheel. Both wheels can be locked together when passing over a slippery road.

The rim and spokes are made of wrought iron riveted together and the spokes riveted to the cast iron hub. The steering attachment is provided with springs keeping them tight and making the engine more easily guided. By excellent mechanical arrangement, the weight of the engine and gearing is concentrated over the driving axle, thus increasing the traction power to a much greater extent than is secured in other engines. It is the only traction engine made that carries the entire engine and machinery independent of the boiler. The axle is made of the best forged cast steel, is very large and has long bearings. A powerful brake is used upon this engine by which its momemtum can be controlled sufficiently to bring it to a standstill within its own length. Great convenience in running is secured to the engine by having the throttle, reverse-motion, blower, brake, steering-wheel, pump, injector, fire and ash-pit doors, whistle and all bearings within easy reach.

A prominent farmer in Lawrence, Dakota Territory, says: "I can say that the engine has done the work of 20 good horses; it has drawn five 16 inch plows and cut furrows four inches deep in prairie sod so that a good seed bed could be had for sod crops, which is done here with four good horses to each plow. These teams turn from 1½ to 2½ acres per day. Not one of these have averaged 2 acres for each day's work. We have several times turned over 10 acres in one-half day and that where there was considerable trouble with hidden stones." Some idea may be had of the immensity of this establishment by saying that the square feet of floor room is over 100,000 feet.

Contracts and Construction.

BRISTOL TOWN, Ill., will build a $10,000 bridge.

THE Brainerd Electric Light Co. has beeu incorporated at St. Paul, Minn.

THE Detroit Fanning Mill Co. has been organized with $300,000 capital.

IMPORTANT water works extensions are to be made by the City Council of Springfield O.

A $15,000 building for the insane will be built in Johnson Co., Iowa, by a one-mill tax.

ennsylvania Railroad Co." will at once build a fine modern depot at Wilkinsburg, Pa.

PROJECTED school buildings: At Eaton Rapids, Nashville, Roscommon and Linden, all in Michigan.

PROJECTED jails and courthouses: At Lansing, Ontonagon and in Schoolcraft Co., all in Michigan.

THE Board of Improvements in Sharon, Pa., is offering free sites for capitalists to locate industries upon.

RECENT fires: Columbus (O.) Basket Co.'s works, and John Denges & Co.'s hub and spoke factory, at Hamilton, O.

THE North Chicago Rolling Mill Co. have decided to build a $100,000 nail mill at Bayview, and will employ 600 men.

COL. A. F. LEFTWICH has purchassd the James River Iron Works, four miles above Lynchburg, Va., for $75,000. He will turn the same into a nail factory.

THE Greenville Pa., M. E. Church fund amounts to $14,000, and when $1,000 more is raised, the erection of a church edifice will be commenced.

THERE is talk of a grand central depot in Cleveland for the Lake Shore & Michigan Southern Railroad, near the new depot of the Nickel Plate road.

A LARGE factory for the manufacture of hay forks and hay elevators is being erected in Muncy, Lycoming Co., Pa., by Messrs. John Waldron and Charles H. Sprout.

HUBBARD O., *Enterprise:* Mr. Wilkins Trick, of Swanse, representatlve of a party of English capitalists, arrived in Hubbard Tuesday night, and is conferring with capitalists and others in regard to the location of tin works here.

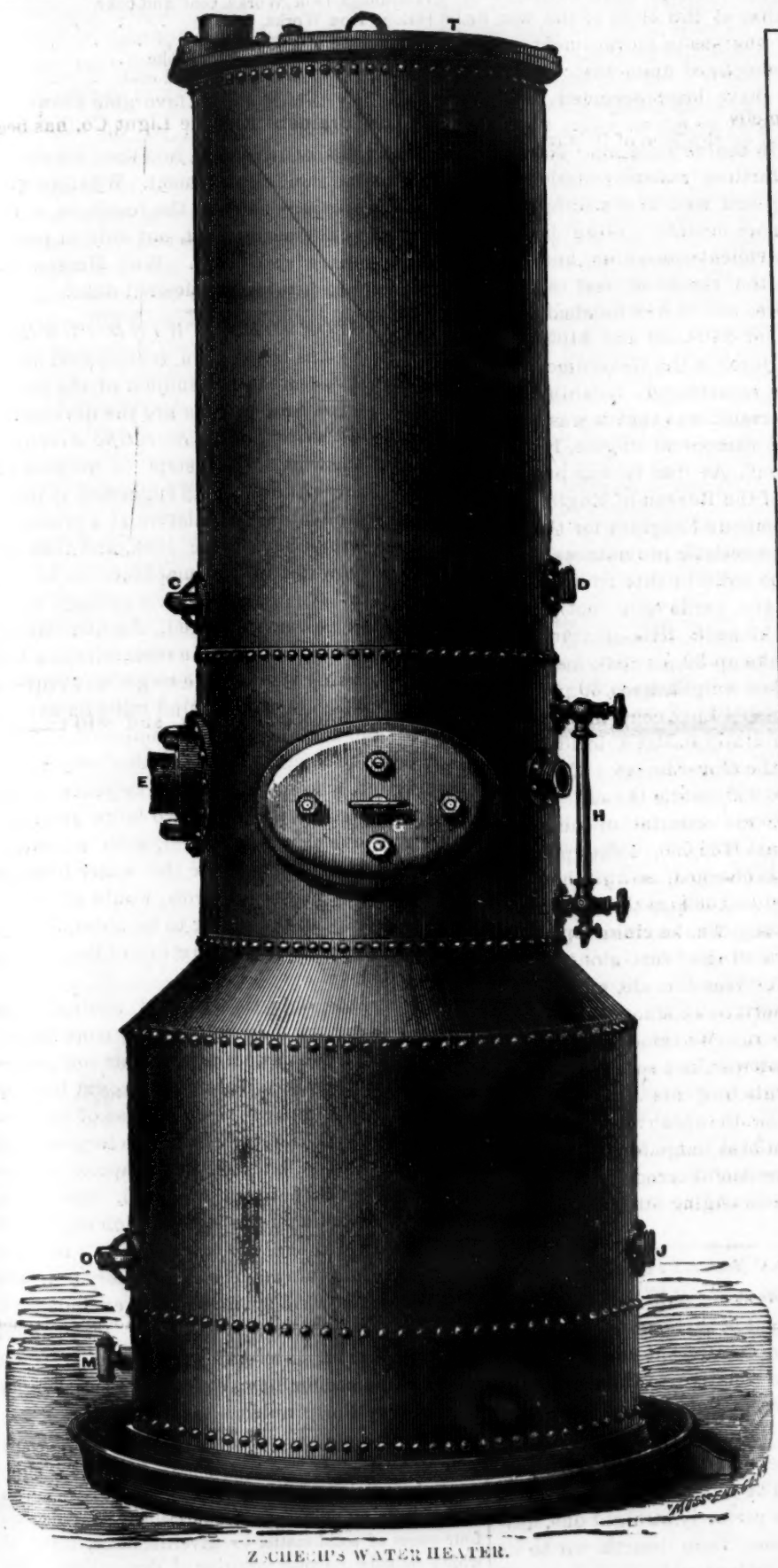
RECENT Ohio incorporatlons, with capital stock: American Automatic Telephone Burglar and Fire Alarm Co., Toledo, $30,000; London Rubber Co., Ashtabula, $50,000; Water Service Safety Co., Cincinnati, $25,000; Sandusky, Ashland & Coshocton Railway Co.. $200,000, by A. Hendry and others.

SUPERINTENDENT WHITELAW, of Cleveland Water Works, has been instructed to at once advertise for bids for the work on the new high service reservoir to be erected on Kinsman street. The time for the completion of new reservoir is to be December, 1884, at which time the Fairmount street basin will also be finished. Its cost should be about two fifths of that of the Fairmount reservoir, which is to cost $350,000.

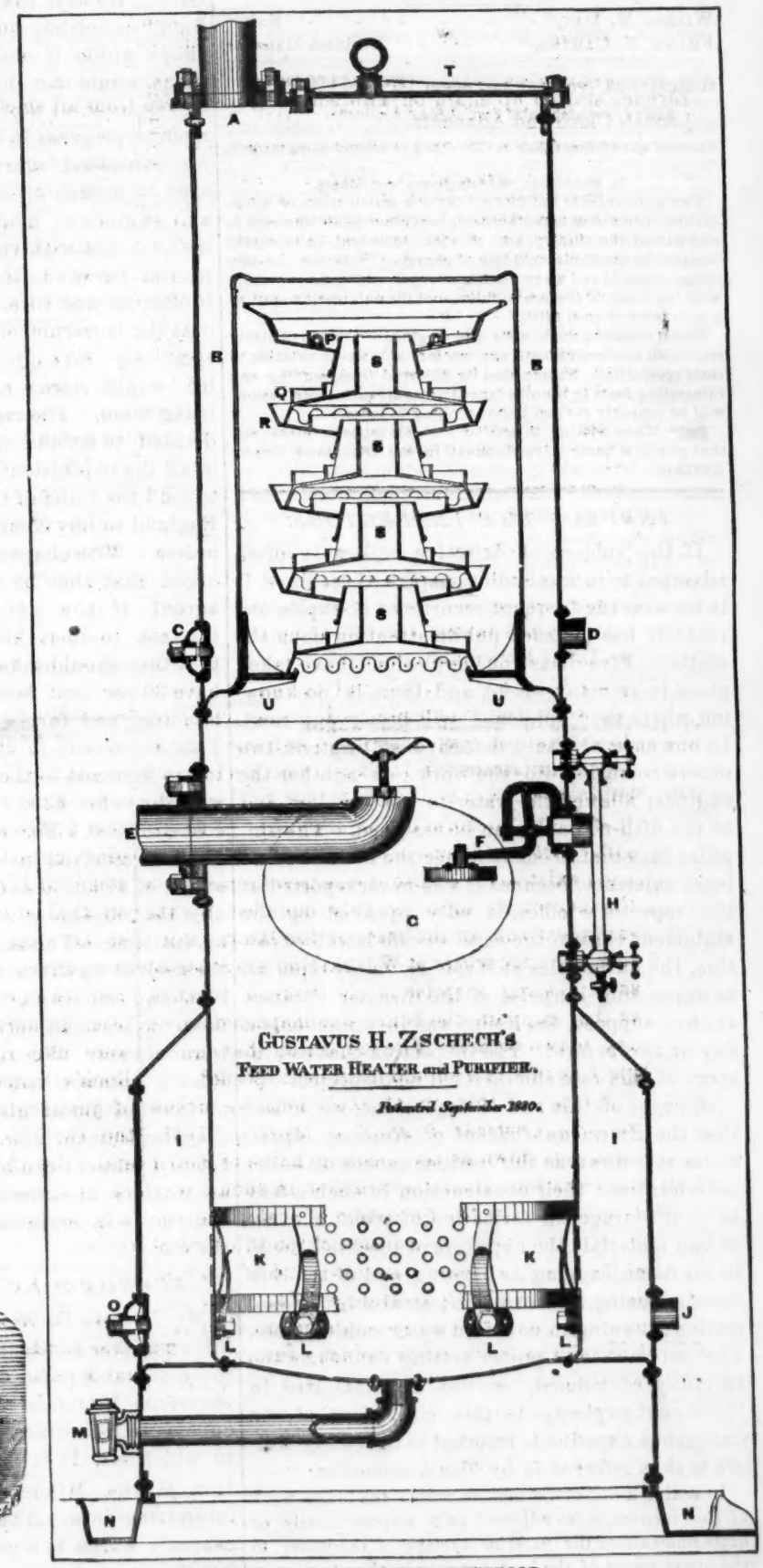
We note with pleasure the marked improvement in the Toledo Commercial Telegram, extending to all its departments—from editorial to mechanical. Gen. Comly and A. W. Francisco are a strong team.

New Type of Feed Water Heater.

A properly constructed heater must have the space containing the water in connection with the outer air; or, better still, the exhaust steam should pass through the water. It must be so arranged that it can be easily cleaned, and every part that the water reaches must be accessible, for the very purpose of the heater is to cause the lime and its impurities to deposit. The exhaust in and out of the heater must be ample and free; the water must be exposed to the action of heat, and interrupted in its passage as much as possible, so that the gas may be driven off and the precipitates may have time to settle. If the steam comes into direct contact with the water, the heater must be so constructed that what oil and grease come in by the exhaust, from the engine, can not pass over into the boiler. It must use nothing but exhaust steam. Whatever heat can be taken from the steam that goes out by the exhaut, is clear gain, but if live steam must be used it will add materially to the cost of fuel. All these conditions the inventor of the heater herewith illustrated, claims to have fulfilled. The heater is built of C. H. No. 1 iron, with castiron removable cones for depositing surfaces, with as many dams as practicable to stop the water in its downward flow. The outside shell extends from bottom to top of heater; the inner shell which forms the chamber two inches wide, is closed below, around the heater, and riveted to the outer shell, and open on top. The lower outside shell extends six inches below the bottom of the heater, and 16 inches above, and is closed up in cone-shaped form. This forms a large chamber or reservoir for the pure filtered water. A sufficient number of brackets is riveted to the inner shell of the top chamber for the support of the requisite number of cones. Each cone has two loopholes, by which they are lifted out the top, for the purpose of being cleaned. The water enters at *d*, rising slowly to the top of *c*, overflows gently around the whole circumference in a spray, into the inverted and upright cones, *r* and *q*, which are provided with annular dams, and a notched or open-work pendent lip. The dams are made of such depth that the water flows back against the dam next above, thus making a series of still water pools, into each of which the water is received gently from the pool above, and in the base of which the mud and lime are allowed to collect quietly, and after passing over all the cones, falls into the large chamber below. The exhaust steam enters at *E*, and discharges the steam under the center of the lower cone, and passes up, filling the space around and between the cones, and escapes at *a*. The steam passes through the water, falling over on to top of upright cone, and is in contact in all its course, heating it thoroughly, and carrying off the carbonic acid which causes all lime to be precipitated. Should any impurities be carried down into the lower chamber, a pipe is attached on the bottom and provided with a stop-cock, at *m*, which is opened once or twice a day, to blow out all muddy substances. *r* is a filtering belt made out of asbestos felt. The shell is perforated four inches from the bottom and four inches wide—all the perforated part is covered with the felt. This filters the water at its clearest point, and effectually removes all matter held in suspension. Grease can not get through felt, if any should be carried over with



ZSCHECH'S WATER HEATER.



ZSCHECH'S WATER HEATER—INTERIOR.

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THE publishers of the TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinists and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

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INSPECT THE INSPECTORS.

If the subject of defective boilers is often adverted to in mechanical papers these days, it is because the frequent recurrence of explosions recently has fastened public attention upon the matter. Five disastrous explosions have taken place in as many weeks, and there is no knowing where the "epidemic" will break out next. In one case it was a defective setting; in two others corrosion did the work; in another the engineer allowed the water to get too low, and in the fifth no cause can be assigned. The singular fact that in one instance the boiler had no legal existence, because it was never reported at the inspector's office, is only equalled by the statement that in the case of the latest explosion, the authorities at Washington are reported as expressing surprise at the disaster because, as they suppose, the boiler was inspected only a day or two before! The inspection that can inspect at this rate should itself be inspected.

Apropos of this run of explosions, we notice that the *American Journal of Railway Appliances* sets down as the leading causes of boiler deterioration: their construction in such a way as to encourage the formation of scale; the use of bad material; the exposure of too thick metal to the flame, causing its burning, and of too thin metal, causing its corrosion; straining by bad setting; running in cold feed water suddenly, etc. The importance of proper setting cannot be too carefully considered, as was demonstrated in the recent explosion in this city. One of the dangerous expedients resorted to in setting boilers is thus referred to by *The Locomotive:*

> In setting a horizontal tubular boiler the brick work of the furnace is so adjusted as to expose nearly or quite one-half of the exterior surface of the boiler to the direct action of the heat, but care is taken to close in the brick sides of the setting at a point below which the water never falls except through carelessness and neglect. It will be readily seen that if the fire and direct heat from the furnace are allowed to come in contact with portions of the boiler that are not protected by the water within, there will be danger of burning the iron and destroying its strength.

To be sure, a greater heating surface can be obtained if the limits of the water protection are not considered, but the expedient cannot be justified on the ground of either efficiency or ordinary prudence. We look for a decided reawakening of public interest on the subject of steam boiler inspection in view of these recent events.

JOHN ROACH ON COMPOUND ENGINES.

John Roach, the great ship builder, in a notable paper in the *American Protectionist* on the history of American naval construction, brings out some remarkable facts regarding the introduction of improved marine engines into our navy. He says that at the close of the war he found unfinished engines in Government workshops which, if completed upon their proposed plans, would not have been accepted by any Government as a gift, so far were they short of modern progress in engine building. Naturally his somewhat startling recommendation that they be broken up and sent to the scrap heap, and engines of more modern design be commenced, met with violent opposition, but events proved he was in the right—all but two were broken up, and these two, if now finished, would cost the Government $800,000 and $400,000 respectively. No engineer in the Government service would dare recommend finishing and using them. The result was that it was finally decided to try the compound engine, in spite of all the opposition. At first it was proposed to send the Chief of the Bureau of Engineers to England to buy compound engines for the Tennessee. With characteristic promptness, Roach urged that they be built in this country, and agreed if the navy yards were not equal to the task, to do it himself. His guaranty was that they should take up 30 per cent. less room, have 30 per cent. less weight, burn 30 per cent. less fuel, and furnish 40 per cent. more speed. This he literally fulfilled, and at a decided saving in first cost to the Government. The work was done for $300,000, while the old engines cost $760,000. For the material of the old engines he received just $35,000, scrap price, instead of $760,000 as charged, so that he got in all $335,000—not $1,060,000, as the slander ran at the time. The engines, he claims, paid for themselves in the saving of fuel alone in the first two cruises the vessel made, and she has been in service continually since the engines were altered. We refer to this feature of Mr. Roch's noteworthy paper, not so much by way of justification of his business relations with the Government (as to which readers of the entire document can best judge for themselves), as to show the wonderful progress that has been made in engine-building since the close of the war.

ECONOMY IN MELTING IRON.

Mr. Thomas D. West, of this city, the well-known author of "American Foundry Practice," has a valuable paper in a recent number of the *American Machinist* relative to the working of cupolas in four different foundries in Cleveland, to which Mr. P. L. Simpson, of the North Star Iron Works, Minneapolis, Minn., adds some interesting data. The cupola used at the Minneapolis works is a perfectly straight one, having the same diameter from hearth up to its full height. Its diameter inside the lining is 35 inches. Their method of charging is as follows: For heats up to 8,000 lbs. they put on bed 450 lbs. of coke, on top of this 1,800 lbs. of iron. They then charge up with 600 lbs. charges, using 50 lbs. coke between the same. For a flux they use fluor spar. Taking as a basis a heat of 8,000 lbs. of iron (as figured on by Mr. West), Mr. Simpson institutes the following comparison as to the amount of fuel used in melting the same:

		POUNDS.
Cleveland	Cuyahoga Iron Works, coal and coke	1,428
	Globe Iron Works, coke	1,410
	Eclipse Iron Works, coke	1,508
	Viaduct Iron Works, coal and coke	1,878
North Star Iron Works		960

For the bed the North Star Works use 300 lbs. of coke and 200 lbs. of coal, and instead of 50 lbs. they use 60 lbs. of coke between the charges; taking a heat of 8,000 lbs. we have therefore the following record:

		POUNDS.
Cleveland	Cuyahoga Iron Works, coal and coke	2,461
	Globe Iron Works, coke	2,290
	Eclipse Iron Works, coke	2,457
	Viaduct Foundry, coal and coke	2,889
North Star Iron Works, coal and coke		1,900

Certainly this is a very favorable showing, in point of economy of fuel, on the side of the Minneapolis foundry men, and they are entitled to credit for their achievement. What we would like, however, to complete the result, is a computation of the actual cost, not only in pounds, but in dollars and cents. Will Messrs. West and Simpson furnish the desired data?

THE STORAGE OF WIND POWER.

Attention has lately been reawakened in the mechanical world to the subject of the storage of wind power, and various are the devices suggested. One writer (in the *Scientific American*) broaches the idea of a system of weights and clock-power. Another plan suggested is that of forcing water into accumulators at a pressure of say 500 pounds per square inch, and then conducting the water to the machines to be operated upon. Again, coiled steel springs, wound up by wind power, are urged. Another method still is the storage of water in reservoirs at a high level, and using the turbine to get the required motion. The erection of wind-mills on exposed points and the forcing of compressed air in pipes to the factory, is a further suggestion. One writer, who has given thirty years' attention to the subject, thinks two large reservoirs of water, one above the other, with a powerful pumping wind-mill to raise the water from the lower to the higher reservoir, would afford satisfactory results, the power to be obtained from turbines operated by the return of the water to the lower level.

Among the objections urged against these various plans, we may note as the more important: 1. The heavy cost of the reservoir plan—would the interest and repair account be offset even by the comparative cheapness of the motive power? 2. The necessity of a large surplus of wind power to make up for evaporation and probable leakage in practice. 3. The loss of power in converting the slow motion of the falling weight (in the clock-work plan) into the quick motion of modern machinery. 4. The cost of coiled steel springs might exclude them from being used for this purpose. The subject is certainly an interesting one, and its more general discussion may yet lead to a satisfactory solution of the problem.

A PERSON calling himself J. B. Jordan has recently issued from the press one or more copies of a sheet which he calls the Cleveland Trade Review. He makes no pretence of giving news or miscellany, but devotes four pages of solid matter to advertisements, many of which embody the most torturing of rhymes descriptive of his patrons' wares. We have nothing to say against Mr. Jordan. If he can find people gullible enough to desert legitimate advertising mediums and pay their money for places in such a sheet as this, he can scarcely be expected to throw the chance away, but it is inconceivable that any intelligent business man can be persuaded so to do. Doubtless the "advertisements" are cheap, but no wise man would buy sawdust for food as a measure of economy, and the issue of such broadsides is a wicked waste of ink and paper. The sole value of

an advertisement is the notice it may attract from the public. The greater the number who can be induced to read it, the greater its worth, and the market price of newspaper space is settled by circulation. Such a thing as this Trade Review no one could be induced to read, and its misguided patrons might find better use for their money.—[West Side Sentinel.

We thank the *Sentinel* for calling attention to the above very questionable publication. Whatever its design, it had no right to appropriate the name of the only Cleveland TRADE REVIEW and the person who got it up would have been promptly enjoined by legal process from this unlawful appropriation, had we learned of his intentions in time to act. We utterly and emphatically repudiate any connection, direct or indirect, present or remote, with Mr. Jordan or his counterfeit Cleveland *Trade Review*.

THE mechanical arrangements of the Brooklyn bridge cable railroad are not giving as good results as might be desired. A series of vexatious accidents has been followed by the complete stoppage of the cars until further orders. These accidents have not been confined to any one part of the apparatus but have affected the wooden sheaves of the grips, the wire guy-ropes connecting the brakes and the grip, the automatic switch-opener, and perhaps other parts. The conditions for the working of the cable system are so different on the great bridge, with its immense spring and its swaying motion, that it is not to be wondered at if time has to be taken to adjust it so as to do its work effectively. People would do well, therefore, to manifest a little patience rather than condemn the long suffering mechanical engineers by the wholesale.

CHICAGO, as well as Cleveland, is in the midst of an anti-smoke war. In this city one firm has been fined for technical violation of the ordinance, though about putting in a gas consumer, and in Chicago, the Chicago & Northwestern Railroad Co. has been mulcted in the sum of $250, on the evidence that five of its switching engines had been emitting dense clouds of smoke.

ACCORDING to a paper read by Mr. C. R. Boyd, of Wytheville, Va., before the American Society of Mining Engineers, the cost of making charcoal iron in the New River or Cripple Creek region, is $17.65 per ton, and of making coke iron $10.22 per ton. These estimates are, however, for small six to ten ton furnaces; of course they would be much less with larger furnaces.

THE recent joint convention in Cleveland of the Western Association of Glass-makers and the New York Glass Manufacturers, did not accomplish much in the way of settling definitely the existing labor troubles in the glass trade, but an early compromise is not considered improbable.

WHILE Cincinnati has, according to Bradstreet, thirteen firms rated at $1,000,000, Cleveland, with a considerably less population, has eleven, not to speak of individuals rating still higher. This is one of the reasons why we expect to distance Cincinnati in the not very distant future.

NOT only Pittsburgh, but a host of exhibitors from various parts of the country, will share in the loss which attended the destruction by fire, early Wednesday morning, of the Pittsburgh Exposition building. The loss is put at $1,000,000; the insurance at $300,000.

JUDGE MEYERS, of Easton, Pa., recently decided that blast furnaces are liable to local taxation even though the stockholders pay taxes on their stock.

A MECHANICAL SIR ORACLE.

THE LONDON "ENGINEER" ON PETROLEUM FUEL.

Some Actual Results Disproving its Conclusions.

BY AMANDA T. JONES.

TO THE EDITOR:

My attention has been called to the fact that the London Engineer has spoken out upon the subject of "Petroleum Fuel," and that American editors are copying its fulminations as if the authority were indisputable. Now in point of fact the article referred to is no less superficial than hundreds of others that have originated on this side of the ocean, although somewhat heavier and more difficult to read.

Decisive it cannot be, since it is based upon the false assumption that numberless methods of burning petroleum in what the writer supposes to be "a direct manner," have been in successful operation and that there is positively "no difficulty in burning mineral oils." In support of this view he cites the experiments of Sainte Claire Deville, (French), of Harrison Aydon (English) and of many "others" not worth naming, (probably Yankee), all "employing the use [sic!] of steam in combustion,", and all certainly failures so far as economy is concerned. He states that "with burners on Mr. Aydon's system, in which superheated steam was used for evaporating the oil previous to combustion, and in which a jet of steam was associated with the burning fuel, perfect combustion was obtained, with an evaporation almost identical with the full calorific power of the oil." It does not occur to him that there ever was or ever can be any method of burning petroleum without "evaporation by steam," "association with steam," and all the rest of it; and he has not the smallest glimpse of an idea that a "direct manner" would convey the liquid fuel to the furnace cold, without even the interposition of a steam jet before ignition.

Now I have already shown in the TRADE REVIEW that all indirect methods of burning oil are radically at fault. Not one of them, French, English, or American, depends wholly upon its own merits for heat; but one and all require the aid of wood or coal in starting a fire, while those most nearly successful are accompanied by solid fuel all along their "winding way." Why should not the most inflammable of fuels be trained to burn without assistance? Forcing it to drag on after coal is like driving a stout donkey and a high-bred carriage-horse tandem, the donkey first! The very fact that this has been constantly done, testifies that experimenters have neither perceived its capabilities nor brought them fully to light.

Whatever results any of the innumerable inventors of the superheated-steam jet-hydro-carbon-fuel-burning method may have to show, cannot condemn petroleum as a fire-maker. Any chemically correct statement of the respective calorific powers of coal and oil, cannot alter the fact that in practical operation the former will yield but 62 2-10 per cent of its latent value to form steam, while the latter (properly handled) will yield 98 per cent.; or the fact that the former heats mainly by radiation—in which case much of the heat yielded does not affect the boiler, and the latter heats mainly by convection, in which case almost the entire heat yielded can be made effective.

These small considerations the London Engineer is too majestic not to overlook. It deigns, however, to cipher out the problem of what the "calorific power of oil" really is; and here is the result of its ponderous mathematics: "The evaporative efficiency of 1 lb. of coal to 1 lb. of petroleum is as 1 to 1.64. But as with petroleum the admission of air into the combustion-chamber can be controlled with much greater exactness than with coal, we are disposed to place the possible actual efficiencies as 1 to 2."

Who could have guessed that a London editor, a scientific enquirer, an instructor among inventors, theorists and practical men, would have taken 88 per cent. of coal, from which to deduce its comparative efficieney, when the highest authorities allow but 62 2-10 per cent? Who could have supposed that after flatly asserting that "crude oil is not fit to burn without distillation," he should have loftily added, "there is no difficulty in burning mineral oils?" And how is it that in dividing 100 lbs. by 6.75 lbs.—the exact weight of a gallon of old crude oil—he gets 12⅓ gallons out of it instead of 14.8 gallons. Really a Yankee schoolmaster would not be out of place in the office of the London Engineer.

Now I have had almost insuperable difficulties to contend with in demonstrating the value of my direct method of burning oil, and in not a single instance have I had a fair chance to compare my results scientifically with those obtained from coal. Almost in the beginning of any experimental work however, before my appliances were as nearly perfected as they now are, and my success in exact feeding not what it has since become, I made an attempt in that direction.

A small portable boiler set in the open air (the season being March), was fed with the best bituminous coal, every attention being paid to economy of supply. The water conveyed to the boiler was cold— 56 deg. Fahr. An average pressure of 60 lbs was held for ten hours, with an hourly evaporation of 60 gallons. Amount of machinery run by engine: three pipe machines, a fan, and four or five times a trip-hammer, used from one-half to two minutes, or eight minutes the entire day.

The same boiler on a colder day was run by myself, the engineer, (who was not working in my interest), making records which were found to agree perfectly with mine. I used old Bradford oil, gravity 41½; and kept for ten hours an average pressure of 89 lbs., supplying the boiler with water at a temperature of 45 deg. Fahr. with an hourly evaporation of 90 gallons minus a minute fraction. Amount of machinery run by engine: three pipe machines, a fan, a trip-hammer used as many times each hour, as in the former instance it was used in the whole day. Making no allowance for the differences in temperature of weather and water, (both in favor of coal,) not considering either the 89 lbs. pressure held by the oil-fire, which would give much less evaporation of water in proportion to power gained, than the 60 lbs. held by the coal-fire, the actual efficiencies of coal and oil were as 1 to 2.4. Therefore 833⅓ lbs. of petroleum (123.5 gallons, or 2.98. bbls), did the work of one ton of coal, and evidently a good deal more.

And yet The London Engineer declares that the highest possible actual efficiency of oil is as two lbs. to one of coal.

From some experience in running cylindrical boilers (without how ever any attempt at modifying their arrangements) I conclude that they can be more easily arranged for adaptation to the petroleum fire than portable ones. A man who had used one of my burners during two seasons (of six months each) gave me a testimonial to the effect that his boiler wou d easily use 1½ tons of coal daily, to get the same result as was obtained from 2½ or at the utmost, 3 bbls. of oil. In other words 3,000 lbs. of coal were offset by 850.5 lbs. of oil: comparing as 1 to 3.5. This statement amounts to this, viz: One and two thirds bbls. of oil, or at the very most two bbls. would be fully equivalent to a ton of good coal. Although no exact test was made I have a right to be credited with his least favorable judgment.

As I have before stated I tried an iron-heating furnace, getting it ready for work on 60 gallons of crude oil, it being said to require 1½ tons of coal to secure the same result. It will be remembered that I do not use an iota of any fuel but oil, so there will be no discount except an allowance for the amouut of coal left on the grate-bars. I do not pretend that the furnace could be run, after being so heated, with equal comparative economy, for I had no chance to thoroughly try the matter under good conditions. But in simply getting the furnace hot allowing 500 lbs. as the amount of coal left unconsumed the actual efficiencies of coal and oil were as 1 to to 6.17. What becomes of the calculations of The London Engineer?

The "actual possible efficiencies" of both coal and oil depend upon perfect adaptation of furnace to fuel. Boilers can not be greatly altered to suit the oil-fire, but iron-heating, puddling furnaces etc., can be altered with I have

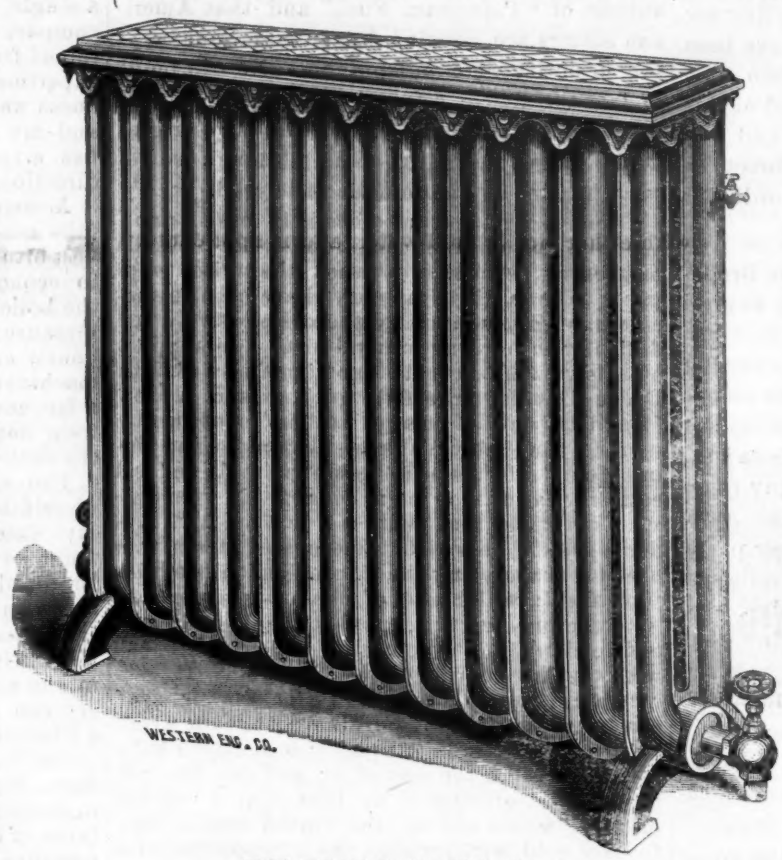
Concluded from Page 7.

PERFECT CIRCULATION OF STEAM.

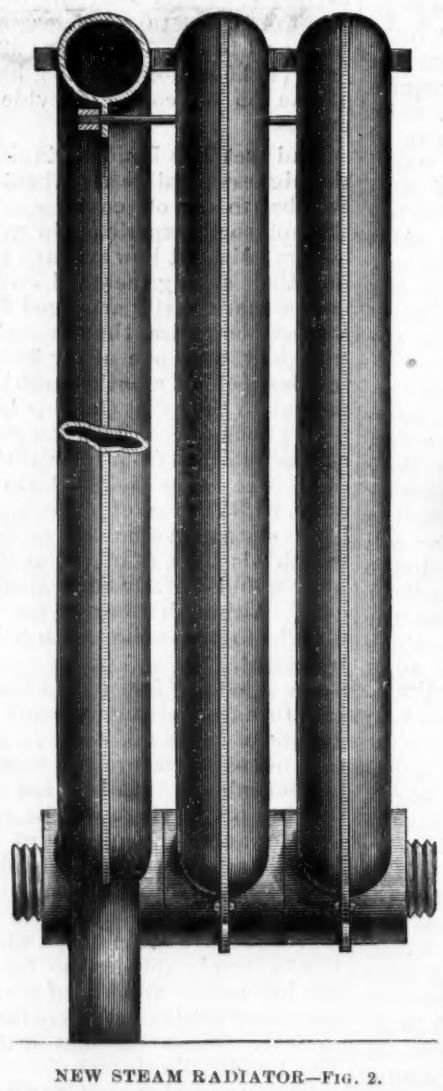
Features of a New Detroit Steam Radiator.

A steam radiator possessing several entirely new features of much interest to manufacturers and builders is illustrated on this page. Perfect circulation of the steam through the various coils of the ordinary radiator is something which, we believe, has not yet been accomplished. There is always more or less of cracking, of retarded heating, and of accumulation of water, which render the use of this system of heating open to serious objections. The illustrations herewith given are of a radiator designed to overcome all of these objections by attacking the problem from its scientific and economic standpoint. Cut No. 1 represents the radiator complete, differing as to its exterior in no perceptible regard from the ordinary radiator. No. 2 gives a sectional view, with nipples, and No. 3, a sectional view, by horizontal plane, through the nipples. Referring to this last-named cut, it will be seen that a diaphragm separates one leg of the loop from the other, so that steam, entering, passes to the right, up one leg to the top of the loop, down the other leg to the opposite diaphragm, and thence into the next column, as shown by the arrows. At the base of each diaphragm is a drain passage, which provides a perfect drainage of the radiator. The claims set forth for this improved radiator by the manufacturers are as follows:

1st. It is adapted to steam, high and low pressure. 2d. It is constructed upon the principle of a coil. 3d. It is noiseless, for the reason that each section is constructed with a drain passage at the bottom in such a way as to leave little or no accumulation of water, from condensation, for the steam to come in contact with, thereby preventing cracking and snapping sounds. 4th. It can be made to fit any place, and occupies much less space in proportion to the heating surface required than any other radiator now in use. 5th. It presents an even surface from top to bottom, is not liable to gather dust, and is easily kept clean. 6th. It has a larger proportion of radiating surface than any other in the market. 7th. Each section is screwed to the adjacent section with a double thick wrought iron nipple, thus forming a perfect joint not affected by expansion or contraction. 8th. It is not liable to get out of order by contraction and expansion, as it has no packing and but two joints to each four feet of heating surface (36 inch size), while the ordinary pipe radiator has eight joints. 9th. In case of damage by frost or otherwise, it can be easily repaired, without removal from the building. 10th. As the sections are made complete and independent of each other, it can be securely and closely packed, and readily put together at place of destination, thereby reducing the cost of transportation and liability to damage. 11th. Each radiator is made of the best grey iron, and is subjected to a hydraulic pressure of 160 pounds to the square inch before leaving the factory. 12th. Another advantage possessed by this radiator over any other, is the readiness with which its size or number of sections may be increased or diminished, as required, without inconvenience. A contractor may order any quantity of the loops, or sections, and vary the sizes as he may desire. 13th. It may be used with or without top.

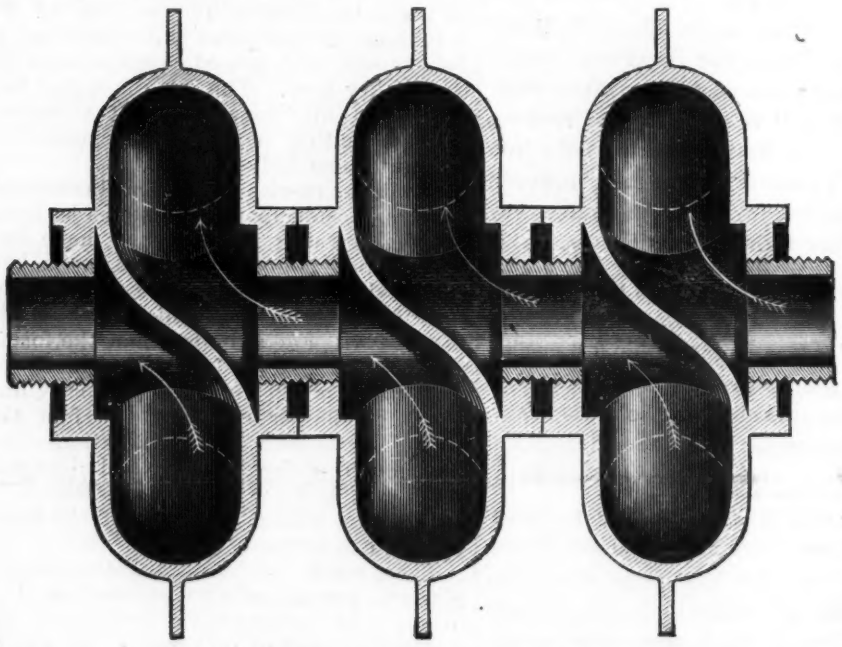


NEW STEAM RADIATOR—Fig. 1.



NEW STEAM RADIATOR—Fig. 2.

The manufacturers of this new radiator are the Detroit Steam Radiator Co., who began operations something over a year ago. It took them until June last before they were ready to begin business with excellent facilities in their present works. The works occupy the entire three story building from 271 to 289 Atwater street, and from 41 to 51 Rivard street. They have a capacity for turning out 1,200 feet of heating surface each day. Whatever large experience can suggest and ample capital procure to prosecute the work is to be found here. Already they are giving employment to about sixty persons and filling orders from all parts of the country. H. C. Hodges is president, Wells W. Leggett vice-president, and C. C. Hodges secretary and treasurer. The company also manufacture straight-way valves of every description for steam and water. They particularly call attention to the Morton valve which is claimed to be the most perfect valve in use. They also do a general foundry business, giving special attention to gray iron castings.



NEW STEAM RADIATOR.—Fig. 3.

New Type of Feed Water Heater.

Concluded from Page 3.

the exhaust steam, into the heater. *f* shows a safety float combined with a valve; when the water rises within four inches of the exhaust, the valve opens and keeps the water from flowing into the exhaust pipe—a safeguard against bursting the cylinder or its heads; and also giving a means of drawing off all grease and scum that float on the surface of the water. The filtered water is taken by the pump at *t*. *h* is a water gauge, to indicate the quantity of purified water on hand, and showing the proper working of the heater. *n* is an annular base of cast iron, on which the heater rests, forming a trough around the heater, which is provided with an outlet, keeps the engine floor from being soiled while the heater is cleaned. The inventor and manufacturer, Gustavus H. Zschech, Indianapolis, Ind., confidently claims that the heater will remove from 10 to 50 per cent. more impurities than any other heater in the market. Prices and terms, with further facts, will be furnished by him on application.

A Diffusion Engine.

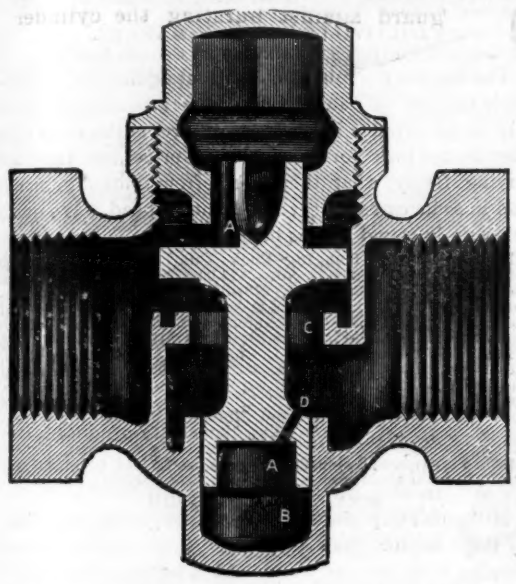
A curiosity in physics was exhibited by Mr. Woodward, lately, at the Physical Society, London, in the shape of what is veritably a diffusion engine, that is to say, a machine in which work is done by the diffusion of gases. The action of the engine is based on an experiment of the late Professor Graham, the well known chemist. This experiment consists in taking red clay porous cylinder containing air, and covering it with an inverted bell jar full of hydrogen. The hydrogen diffuses into the cylinder more quickly than the air diffuses out, as is shown by means of a glass tube projecting from the bottom of the cylinder into a vessel of colored water. When the gaseous pressure inside the cylinder is increased by the influx of hydrogen, the mixed gases descend this tube and bubble out of the water. On removing the bell jar, the action ceases and a reaction, due to fall of pressure, causes the water to rise in the tube. By suspending the gaseous cylinder of porous clay from a balance beam, and directing a jet of hydrogen gas against its side, the beam begins to oscillate and keeps plainly oscillating for a length of time; the action being sustained, as Professor W. G. Adams, F. R. S., pointed out, by the alternations of gaseous pressure in the cylinder.

According to a writer in a foreign paper animal oils are unsafe to use in air compressors, as they take fire spontaneously in compressed air, or in other words they create an explosive gas.

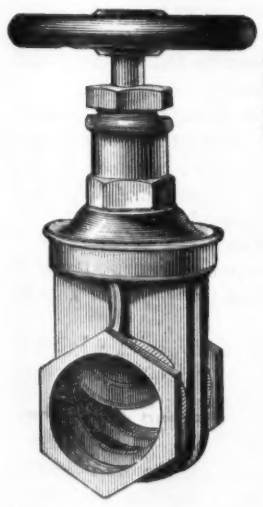
PATENT STOP VALVE.

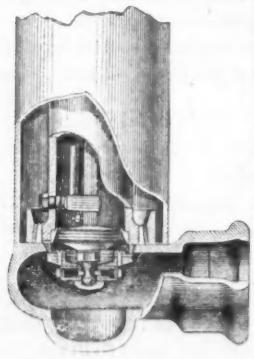
Fire Hydrant and Noiseless Pump and Check Valve.

One of the oldest manufacturing firms of Detroit is that of James Flower & Bros. In all there are three brothers. They are of English birth. In 1840 James, the eldest, came to this country. He tells of its taking three days and two nights to sail from Buffalo to Detroit. Shortly after arrival he worked in the Michigan Central Railroad shops, when the line which then consisted of only thirty-one miles was owned by the State. A few years after James came, his brothers followed him to this country. In 1853 they began business together on their own account, employing no heads or hands but their own. In 1856 they commenced a factory

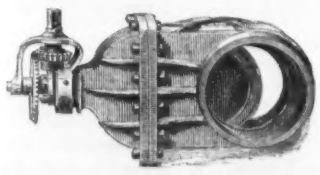


at their present location, corner of Brush and Woodbridge streets. At first they manufactured fire engines and any kind of machinery used on land or water. Afterward they devoted themselves to the manufacture of gas, steam and water works supplies and general brass work. These are their principal branches now. It is said they have introduced more improvements in brass-working tools than any other firm in the country. James is the inventor of the family. He has the advantage of being a practical mechanic, having served an apprenticeship of seven years as millwright and machinist. One of his inventions is a patent stop valve for steam, water, or gas. It is made from half inch up to 50 inches, weighing from a few ounces up to tons. For water it can be





fixed in mains, and where steam or gas is used can be placed in the pipes with equal facility. It is worked by screw or lever, as required, and can be moved gradually. It is claimed by the manufacturers to be the most perfect device of its class, and obtained a medal at the Philadelphia Centennial Exposition. These valves sell largely in Canada as well as through the States. A patent fire hydrant for the use of fire depart-



ments in the extinguishment of fires, is another device manufactured by the firm. Its main

than was anticipated in the start by its most sanguine friends.—[Chagrin Falls Exponent.

THE Youngstown Rolling Mill is on double turn in every department.—When the improve- features are extreme simplicity, ease of application, and durability. It is claimed to be the superior of any similar device in these particulars. It has been adopted in many cities throughout the country, and would be in request in Canada but for the tariff barrier.

In August last the firm secured patent for a Noiseless Pump and Check Valve. By means of this arrangement the noise which occurs on every revolution of the pump and check valve as ordinarily constructed, is done away with. Every one knows the unpleasant annoyance and destruction of the valves which this causes. This is wholly obviated by the water cushion valve. Being made of metal, it can be used with either hot or cold water, and is applicable to all kinds of pumps. The firm manufacture a single-valve patent hydrant and also a duplex-valve hydrant. They deal in all kinds of wrought iron pipe and fittings for the same.

Manufactures.

[Concluded from Page 3.]

ment and repairs at the Girard mill are completed it will be a model rolling mill.—The Morse Bridge Works began running double turn this week. They have over $200,000 worth of contracts on their books.—The Youngstown Stove Works are running steady, the trouble in the moulding department having been settled.—Cartright, McCurdy & Co. have all their mills on double turn except the ten-inch. Orders are reported coming in at a fair rate.—Andrews Bros. & Co. are running their muck and plate mills full time, and the other departments about half time. But one of their blast furnaces is in operation.—The Hamilton Works have just completed and are engaged in erecting a vertical blast engine at the Hannah furnace. The diameter of the steam cylinder is thirty-eight inches, diameter of blast cylinder eighty-four inches, and 48-inch stroke.—[Youngstown News-Register.

IN GENERAL.

THE production of the Pittsburgh Bessemer Steel Works, at Homestead, Pa., week before last, was 2,500 tons of ingots and 21,000 tons of rails. When the works were built the output was to be 60,000 tons per year, but more than that is produced each month.

A FEAT unparalleled in the history of rail-rolling, says an exchange, was accomplisned at the steel rail mill of the Scranton, Pa., Steel Co. Steel rails 120 feet long were rolled directly from the soaking pit. This has never been done either in Europe or America. Rails have been rolled direct from the pit, but not 120 feet in length.

OCTOBER 1, J. L. Perry & Co., Berlin, Wis., opened the extensive additions to their works. The molding department is now 120x45, with a wing 30x60, two stories high. The foundry is 100x50. Employment is given to from 75 to 100 machinists nnd moulders. They say in a communication to the TRADE REVIEW: "Our different departments are in the hands of thor oughly competent men, and we trust with our increased capacity that we will be able, for the first time in five years, to fill the demands for our machinery promptly. We have for many months past been from 30 to 90 days behind orders. At the present time of writing we are 90 days behind."

A MECHANICAL SIR ORACLE.

[Concluded from Page 5.]

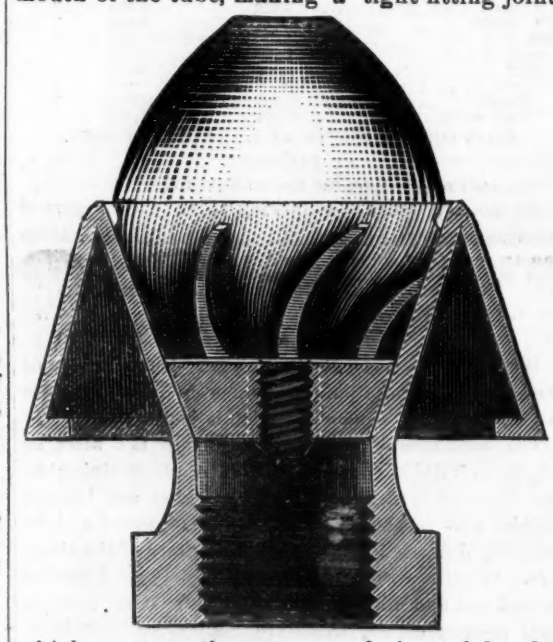
reason to believe, results that would force the editor in question to do a great deal of mathematical labor in order to "catch up" with them. I am aware that an opinion from England has great weight in this country; but my ancestors were what good King George called "trumpets of sedition," and fought hard to free their descendants from dependence upon the "mother country," and really I prefer to do my own thinking; believing that any ordinary Yankee can contrive to worry along without "employing the use" of English brains, though they were ten times as weighty as those represented by The London Engineer.

A SUPERIOR FLUE CLEANER.

The Aitchison & Doolittle Patent.

As a matter of shop economy alone, the selection of a flue cleaner is a very important consideration. It represents simply the difference between three or four hours of laborious scraping and five to fifteen minutes of just as effective work by means of an improved scraper and steam jet combined. Not only this, but where the operation of cleaning tubes is one easily and expeditiously performed, it can be gone through with at much more frequent intervals, thus manifestly to the great advantage and the longer life of the boiler, not to speak of the most important element of all, the economy of fuel. A very effective and widely popular flue cleaner is illustrated by two accompanying cuts,

viz: the Aitchison & Doolittle patent, now owned by Messrs Jas. E. Rundle and Baxter Trevor and made by the Cleveland Flue Cleaner Manufacturing Co., 22 and 24 Power block, Frankfort street, this city. As will be seen, it is exceedingly simple in construction, easily applied, and requiring no adjustment but attaching the hose. It has no wheels, springs, valves, or other complications. Its construction insures a spiral motion to its steam jet, which is delivered directly against the face of the tube. The conical face of the cleaner adjusts itself to the mouth of the tube, making a tight-fitting joint



which prevents the entrance of air, and by doing away with any possibility of condensation, insures a current of dry steam. The advantage of these features is evident from the fact that a blast of steam delivered into the boiler tube from a common pipe or other appliances in use, carries with it a large volume of air from the boiler room, which condenses the steam; this moistens the surface of the tube. The straight blast of steam rushes through the tube, only partially removing the collection of dirt, etc., and that part of the soot which remains becomes wet, and when the draft from the fire is again turned on, becomes baked to t e tube and makes a clot and obstructs the flues. This flue cleaner has been thoroughly tested and heartily commended by leading manufacturers and railroad companies, and has been adopted for use in the United States Navy. The company has lately been reorganized and is pushing business in all directions.

American Society of Mechanical Engineers.

The Annual Meeting of the Society will be held in New York city during the week ending November 3d. Detailed programmes will be sent out later. Members who have papers to present to this meeting are requested to send the titles to the Secretary, and to furnish him their manuscript as early as possible, that they may be put in type in advance of the meeting. Drawings for reproduction should be in black and white, and should be forwarded considerably before the date of the meeting.

Market Review.

OFFICE OF TRADE REVIEW AND WESTERN MACHINIST.
CLEVELAND, FRIDAY EVENING, October 5, 1883.

IRON ORE.

Prices are stiffening under the influence of somewhat larger orders and the approaching close of navigation, which will leave the docks with smaller stock-piles than last year at the same time. We hear of sales ranging from 1,000 to 5,000 tons the past week. Receipts for the week have been 21,925 tons and shipments 17,676 tons. The total receipts at Cleveland for the month of September were 67,281 tons; total shipments. 47,574 tons. Lake freights are unchanged, but still rule high, $1.75 being the uniform figure from Marquette and L'Anse to Lake Erie ports. Concerning the total shipments of ore from Lake Superior mines this season, indications already point to a larger aggregate than estimated earlier in the season. It was then thought that the entire output would not exceed 1,000,000 gross tons, but up to September 26 it had reached 1,696,724 tons, which leads the Marquette Mining Journal to predict that, unless the shipping season should close unusually early, the total will exceed 2,000,000 tons, or about a quarter of a million tons less than in 1882.

The Age of Steel reports the sale in the St. Louis market of about 70,000 tons of Pilot Knob ore on six months' delivery, through a single firm—one of the largest transactions that has occurred in that city.

No. 1 Specular and magnetic Bessemer Ores per ton	$7.00@ 7.50
No. 1 Specular (non-Bessemer) ores per ton	5.50@ 6.50
Bessemer Hematites	5.00@ 5.25
Non-Bessemer Hematites	4.75@ 5.00
Menominee Range Bessemer	6.25@ 6 75
Menominee Range non-Bessemer	4.75@ 5.00

Receipts and shipments of iron ore at Cleveland each day the past week have been as follows:

Date.	Receipts (tons).		Shipments (tons).	
Sept. 27	5,500	"	3,201	"
" 28	5,610	"	3,295	"
" 29-30	....	"	4,482	"
Oct. 1	3,635	"	1,572	"
" 2	5,295	"	2,771	"
" 3	1,885	"	2,355	"
Total	21,925	"	17,676	"
Last week	37,403	"	15,431	"

IRON ORE RECEIPTS AT LAKE ERIE PORTS.

AT FAIRPORT.

[Specially reported for the TRADE REVIEW.

FAIRPORT, Oct. 4.—Following is the daily report of receipts of ore at Fairport for week ending Oct. 3, 1883:

Date.	Iron Ore Received.
Sept 28	1,439 Tons
Oct. 1	1,147 "
Total	2,586 "

PIG IRON.

We cannot do better this week than quote, apropos of the situation in pig iron, the October circular of Rhodes & Co., Cleveland, a copy of which is just at hand:

The condition of the iron trade does not seem as bright as it did one month ago. The silver lining on the cloud, of which we then spoke, has not become broader and brighter. The spurt has proved a short one, and dullness is the prevailing feature of the situation. We alluded last month to the fairly good returns we had had and might expect to have from our agricultural operations; but premature September frosts have destroyed the brilliant expectation that we might raise the largest corn crop ever known in this country, and a careful consideration of the subject can only lead to the conclusion that the outcome of our agricultural work is, at best, only fair. The wheat crop is 86,000,000 bushels short of last year's yield. The oat crop is 60,000,000 larger. The most reliable estimate figure this year's corn crop at 1,600,000,000 bushels, which is 25,000,000 less than last year. Based on these figures, our total crop of grain will not vary a great deal from 2,640,000,000 bushels, which compares with previous years as follows:

1882—2,688,000,000 bush.	1881—2,034,000,000 bush.
1880—2,704,000,000 "	1879—2,986,000,000 "

With the exception of the disastrous year of 1881, the yield is about the same; but, while our agricultural yield has not increased in the past four years, our population has largely augmented. The production in bushels of grain per head of population has been:

1876	1880	1881	1882	1883
55.1	53.9	39.6	50.1	48.7

The addition to our railroad mileage and the extension of our manufactures have been more rapid than our increase of population; and this has gone on while our agricultural development has apparently remained stationary. We say apparently, because the unsatisfactory results have come from a bad spring and an early fall. They have not been caused by any lack of labor to till the soil, nor has energy been lacking on the part of the farmer, as the acreage for grain was much greater this year than ever before. Nevertheless, from whatever cause, the fact remains, and, as our exports are almost wholly agricultural products, the careful observer cannot fail to see that the exhibit is not entirely cheerful. However, when we compare the present year with 1881, we see at once that we have no reason to expect any such serious consequences as followed from the very short crop of that year. We have, happily, carried over a fair surplus from last year's crop; there is no reason to fear that food will be very dear at home, and we shall have a reasonable overplus to send to Europe, where the harvest has been less satisfactory than here. Fortunate is it for the country that the short yield has not been accompanied with rampant grain speculation, which has, at times, seriously interfered with our export trade. The shipments of breadstuffs are fair, and, if kept up at the present rate, we will easily dispose of our surplus and keep our foreign trade balances in a healthy condition. ∴ ∴ ∴ ∴

We cannot speak of the present condition of the iron trade without recurring to the main immediate cause of the present stagnation. It is the decline in new railroad construction. Up to September 21st, for four years the record of new railroad building is as follows:

For 1883, 3,687 miles.
" 1882, 7,164 "
" 1881, 4,474 "
" 1880, 3,539 "

These figures plainly show why the demand for iron is not brisk and why prices are low.

Since January 1st, 1882, we have been going through an era of liquidation. That we got to the bottom last summer we fully believe, and we think that the period of recuperation has begun. Our crops this year have been large enough to ward off any threatened financial disaster, had we been in any such danger. But, had they been immense, we believe it would have hastened our recovery. Our railroads, in that event, would have had a large business this coming winter and would have been liberal buyers. ∴ ∴

Receipts and shipments of pig iron at Cleveland each day the past week have been as follows:

Date.	Receipts, tons.		Shipments, tons.	
Sept. 27	132	"	13	"
" 28	312	"	170	"
" 29-30	376	"	46	"
Oct. 1	17	"	213	"
" 2	140	"	78	"
" 3	375	"	..	"
Total	1,352	"	520	"
Last week	2,749	"	330	"

CHARCOAL PIG IRON.

No. 1 Lake Superior charcoal	$23.00@25.00
No. 2 Lake Superior charcoal	23.00@25.00
Nos. 3 and 4 Lake Superior	24.00@27.00
Nos. 5 and 6 Lake Superior	23.00@25.00
Nos. 1, 2, 3, 4, 5, Salisbury	35.00@37.00
Southern Car Wheel	28 00@33.00

BITUMINOUS AND COKE IRON.

No. 1 foundry, all lake ores	$21.50@22.50
No. 2 same	20.00@21.00
No. 1 foundry, lake ores, with cinder mixture	20.50@21.50
No. 2 same	19.50@20.50
No. 1 foundry, native Ohio ores	21.00@22.00
No. 2 same	19.00@20.50
No. 1 silvery, native Ohio ores	21.00@22 00
No. 2 same	18.00@20.00
No. 1 gray forge, red short	19.00@20.00
No. 1 gray forge, neutral	18.00@19.00
No. 1 Bessemer	22.00@23.00
No. 1 "Arnold" American Scotch	24.00
No. 2 " " "	23.00

CINCINNATI PIG IRON MARKET.

[Reported for the TRADE REVIEW by E. L. Harper & Co.]

Business continues moderately active. Pig Iron stocks are light. The furnace yards are not burdened, and consumers generally have much smaller supplies on hand than usual at this season. Demand keeps about even pace with production. The general impression is that the bottom has been reached, and that while the present low figures may prevail a while that the geneal industries of the country will warrant an improvement a little later. We quote as prices current as follows:

FOUNDRY.—Hanging Rock Charcoal, No. 1, $23 75@$24 25; Hanging Rock Charcoal, No. 2, $23 50@$23 25: Strong Neutral Coke, No. 1, $19 50@$20 50; Strong Neutral Coke, No. 2, $18 00@$19 00; American Scotch, No. 1, $18 50@$19 00. GREY FORGE.—Neutral Coke, $17 50@$18 00; Cold Short, $16 50@$17 00. CAR WHEEL AND MALLEABLE—Hanging Rock, Strictly Cold Blast, $27 00@$28 00; Hanging Rock Warm Blast. $24 00@$24 50; Lake Superior, Charcoal all grades $26 50;@ 27 00 Southern Car Wheel Strictly Cold Blast, $28 00@$29 00.

[Reported for the TRADE REVIEW by Rogers, Brown & Co.]

The volume of business during the week just closed has been large, but mainly transacted at inside figures. The buying has been about equally divided between early and forward deliveries, with a disposition to ask and give a shade higher for contracts running into the future than for immediate shipment. Stocks in the hands of Southern furnaces are light with a better assortment of grades than usual. Silver Greys and "softeners" continue in light supply and are relatively higher than other strong irons. The following quotations show the range of the market on a cash basis:

Hot Blast Foundry.—Hanging Rock Charcoal, No. 1, $23 50@$24 50; Hanging Rock Charcoal, No. 2, $22 00@$23 50; Southern Charcoal, No. 1, $22 00@$23 50; Strong Coke, No. 1, $20 00@$21 00; Strong Coke, No. 2, $18 50@$19 00; Strong Coke, No. 3, $18 00@$18 50; Soft Stone Coal, No. 1, $20 00@$20 50; Soft Stone Coal, No. 2, $18 00@$19 00. Forge—Strong Neutral No. 1 mill, $17 00@$17 50; Cold Short No 1 mill, $16 00@$17 00. Car Wheel & Malleable—Hanging Rock Cold Blast, $31 00@$33 00; Hanging Rock Warm Blast, $25 00@$27 00; Southern Car Wheel Iron, $26 50@$27 50; Lake Superior Car Wheel Iron, $25 00@$26 00: Lake Superior Malleable Iron, $25 00@$26 00.

PITTSBURGH PIG IRON MARKET.

[Reported for the TRADE REVIEW by A. H. Childs, 93 4th ave.]

During the past week business has been very quiet and the demand for pig iron lighter than for some time. Producers still have hopes of an improved trade during this month and claim that no further concession in price can be considered, in view of the fact that cost of making iron is now barely covered. Quotations are:

No. 1 Foundry, $20 00@21 00, 4 mos.; No. 2 Foundry, $18 00@19 50, 4 mos.; Gray Forge, $17 50@19 00, 4 mos.; White and Mottled, $16 50@17 00, 4 mos.; Warm Blast Charcoal, $24 00@28 00, 4 mos.; Cold Blast Charcoal, $27 00@35 00, 4 mos.

CHICAGO PIG IRON MARKET.

[Reported for the TRADE REVIEW by A. B. Meeker & Co.]

There is a fair demand with a prospect for an active market during the next three months. We quote to-day, (October 2):

Lake Superior Charcoal, 1 & 2, $23 00@$24 00; Lake Superior for Car Wheels, No. 3, $23 50@$25 00; Lake Superior for Car Wheels, 4 and 5, $24 00@$25 00; Scotch, according to brand, No. 1, $27 00@$28 00; Hanging Rock, Charcoal, No. 1, $25 00@$26 00; Hanging Rock Coke, No. 1, $21 00@$23 00; Anthracite, No. 1, $22 00@$23 00; Anthracite, No. 2, $21 00@$22 00; American Scotch, No. 1, $23 00@$26 00.

LOUISVILLE PIG IRON MARKET.

Reported for the TRADE REVIEW by Geo. H. Hull & Co.

The market for pig iron continues quiet with a moderate amount of sales. Consumers are satisfied there will be no advance in the near future; at the same time they do not look for much lower prices, so they are buying freely what they need from month to month and in some cases for several months ahead. We quote for cash, in round lots, as below:

FOUNDRY IRON.—Hanging Rock Charcoal, No. 1, $24.00@$24.50; Southern Charcoal, No. 1, $22.00@$22.50; Hanging Rock Stone-coal and Coke, No. 1, $19.50@$20.50; Southern Stone-coal and Coke, No. 1, $19.50@$20.00; Southern Stone-coal and Coke, No. 2, $18.50@$19.00; "American Scotch," $19.00@$20.00; Open Silver Gray, $18.00@$18.50; Close Silver Gray, $17.50@$18.00. MILL-IRONS.—No. 1, Charcoal, $19.00@$20.00; No. 1, Stone-coal and Coke, Neutral, $17.50@$18.00; No. 2, Stone-coal and Coke, Neutral, $16.50@$17.00; No. 1, Stone-coal and Coke, Cold Short, $17.00@$17.50; No. 2, Stone-coal and Coke, Cold Short, $16.50@$17.00; White and Mottled, Cold Short and Neutral, $15.00@$15.50. CAR-WHEEL IRONS.—Hanging Rock, Cold Blast,, $30.00@$32.00; Hanging Rock, Warm Blast, $23.00@$24.00; Alabama and Georgia, Warm and Cold Blast, $27.00@$28.00; Central Kentucky, Cold Blast, $26.50@$27.00.

MANUFACTURED IRON.

Mill men complain that they cannot get figures to justify them in more than supplying regular customers and keeping their men at work. At a letting of about 200 tons of bar iron in this city last Tuesday, as low as $1.70 was held to by the purchaser, with the intimation that the order would not be placed at anything higher than this. Mill men hesitate to take orders at this figure, claiming that there is no money in it. One large mill company stated to a representative of this paper that they did not want it generally known that they were rolling iron at present rulling prices, as they did not seek or desire outside orders at these starvation figures. As a whole, the situation this week is decidedly "off."

Receipts of bar iron the past week have been 793 tons, shipments, 1,023 tons.

RAILS—The mills are making about two-thirds time to fill ordinary orders, though no large sales are reported. We quote steel rails steady at $42 per gross ton. Shipments the past week has been as follows: Iron rails, 1,034 tons,; steel rails, 541 tons.

WROUGHT PIPE—The pipe manufacturers have recently held two meetings but without result as to readjustment of prices. They will meet again soon, when it is expected something definite will result. As high as 30 off is quoted on fittings; no change in other goods.

HARDWARE.

Trade is fair, with a more especial demand for sheets and goods generally for the Fall trade. Collections are close.

NAILS.—The nail market is steady, and the supply is adequate to the demand, at $2.85 in quantities. Receipts at Cleveland the past week 4,392 kegs; shipments, 5,788 kegs.

COAL.

Trade is very good, dealers reporting more orders for lake shipment than they can fill. Prices are unchanged. The retail market, both as to anthracite and bituminous, is active. The threatened strike in the Mahoning Valley has not become general. In the Tuscarawas and Hocking Valley mines, work is progressing steadily. Lake freights are steady, at 80a85c to Chicago and Milwaukee.

Receipts and shipments of coal at Cleveland each day the past week have been as follows:

Date.	Receipts (tons). Anthracite.	Bituminous	Shipments (tons). Anthracite.	Bituminous.
Sept. 27	196	3,800	32	2,694
" 28	194	4,899	35	3,230
" 29-30	313	6,466	3	6,920
Oct. 1	9.3	6,542	12	1,746
" 2	713	1,743	..	969
" 3	244	1,429	...	2,647
Total	2,613	24,879	82	18,206
Last week	1,672	32,042	174	8,223

COKE—Receipts of coke at Cleveland the past week have been 4,182 tons. A big coke deal is reported at Pittsburgh, H. C. Frick & Co. purchasing the Standard mines, 575 ovens and 1,700 acres; price, $700,000.

Cleveland Wholesale Prices.

[The lowest quotable prices are given in all cases.]

HARDWARE.

Adzes.

Carpenter's.....per doz $18 40
Ship..... " " 18 75
Heavy railroad.. " " 19 50

Axes.

per doz.
James' 3d qual..... $7 00
Buckeye..... 7 75
" doub. bitt..... 15 00
Hunt's..... 9 50
Mami's..... 8 00
Lippincott's Crown..... 8 50
Cut More..... 9 00
Peck's Double Bit..... 22 00
"Champion Blade..... 11 00
Good triple silver steel.. 11 50

Axles.

Standard list,....
Nos. 1 to 6, 50 & 10 off
Nos. 7 to 14, 50 & 5 off
Nos. 15 to 18, 45 off
Nos. 19 to 22, 50 & 5 off

Anvils.

per lb.
Eagle, Amer.....10c dis 20
Wright's..... 11¾c@11c
Armitage's Mouse Hole..... 9¾c@9¾c
Trento..... 10¾c
Wilkinson's..... 10¾c

Anvil Vise and Drill.

Millers Falls Co. $28.....dis 20
Cheney Anvil and Vise dis25&2

Augurs and Bits.

C S cut augers.....dis 50&10
do do do bits..... 50&10
D C gimlet do Ives.. dis 50
Snells bits.....dis 40&10
Russell Jennings' augers, dis 10&10&10
Cook's pat augur.....40&10

Animal Pokes.

Akron.....$ 3 50
Camp's..... 4 00
Berea, per doz..... 4 00
Eagle, per doz..... 5 00

Apple Parers.

Domestic&Reading ℔ doz.$7 00
Turn Table..... 4 50

Bolts.

Machine..... dis 70
Plow..... dis 40
Plow, R. B. & W..... dis 40
Cast Iron Barrel Shutter, etc.....dis 55&10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts. dis 50
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
Wr'g't Shut'r, all iron, Stanley's list.....dis 50&10
Tire, R. B. & W., new list.....dis 70&10
Stove, American Screw Co.'s..... dis 40
B. B. & W.....dis 40
Bolt Ends 16c. per lb. net.... 70

Bellows. Dis

Hill,s.....40 pr cent
Bl'ksmith's com new list,50 ℔ ct
Moulder's new list, dis 25 ℔ ct
Hand, new list, 25 per cent

Butts. Dis

Wrought brass..... 70
Cast, loose joint.... 60&10
Pin, loose..... 55&10
Wrought, fast joint narrow..... 50&10
Wrought fast joint broad..... 50&10
Wrought loose joint broad..... 55&10
Wrought table and back flaps..... 50&10
Loose joint, without acorns..... 55&10
Ten per ct. extra dis for cash.

Boiler Plates.

"Gaylord"-Standard Quality.
C. No. 1.....1 50
C. H. No. 1 Shell.....4 75
C. H. No. 1, 50,000.....5 25
C. H. No. 1, 55,000.....5 75
C. H. No. 1 Flange.....6 50
Firebox.....
T. S., 60,000.....(as per)..6 50
T. S., 65,000.....(act of)..
Homo. Steel, 70,000 (of Cong) 7 50
Heads, ¼c ℔ lb. extra.
N.B.-Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch.....dis 25
"National" Special Locomotive Tubes.....net list

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Boiler Makers' Tools.

Doty's Power Shears..net list
" Hand Lever Shears.net list
" Power Punch.....net list
" Hand Punch.....net list
Steel Screw Punch.....net list
Iron Screw Punch.....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander..dis 15
Roller Tube Expander.net list
National Tube Cleaner .dis 20
Wire Flue Brushes.....net list
Anvils—'Peter Wright' 12¼ ℔ lb
Solid Box Vises net list

Cleveland Stamped Elbows

Genuine Russia Iron

4¼	inch, per doz		5 50
5	do	do	7 50
6	do	do	9 50
7	do	do	11 00

Charcoal Iron

4¼	inch, per doz		2 50
5	do	do	3 50
6	do	do	4 50
7	do	do	5 50

Planished Amer. Russia Iron

4¼	inch per doz		5 00
5	do	do	6 50
6	do	do	8 50
7	do	do	9 50

Discount 33⅓ per cent

Chisels.

Hot and cold cutting...℔ lb 30
Railroad track..... 30
Machinists..... 30
Mallet head..... 50
Tape..... 50
Packing..... 50
Stone cutters..... 50

Crowbars.

Cast steel..... ℔ lb 7
Iron, steel points..... 5c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table net
Am. Miller Bros.' Cutlery Co.....dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co. list net
Aaron Berkenshaw's pocket dis 25
Fram Cutlery Co., table net
Cleveland Cutlery Co...dis 25
Miller Bros., pocket.... 33⅓
Akron Cutlery Co.....dss 45

Coopers' Tools.

Bradley's..... dis15@20
Braton's..... dis15@20

Chains.

Coil by cask.....

3-16	¼	5-16	⅜	7-16	½
10½	9	8	7	6½	6¼

Drills and Drill Stocks.

Blacksmiths', each $2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W ...dis 20&10

Drawing Knives.

Peck, Stow & Wilcox....dis 70
Witherby's.....dis 65@10
Nobles Mfgr. Co..... 15
Adjustable handle..... 20

Emery and Sand Paper.

Regular Numbers.....℔ lb 6c
Flour and F. F.....℔ lb 4c
B. & A. Emery Paper ...dis 35
Sand paper.....dis 35

Enameled & Tinned Ware.

Kettles.....dis 50
Sauce Pans.....dis 30
Tinned Sauce Pans..... dis 30

Files.

Parkin's $5 to £..dis 45 ℔ cent
E. M. Boynton's, new list dis 25
J. & Riley Carr .....4.50 to £.
Johnson & Bro.....dis 50
Butcher's.....4.50 to £.
Walter Spencer & Co.'s "Diamond"..... 4.50 to £.
Fisher's.....4.75 to £.
Moss & Gamble.....4.50 to £.
H. Disston & Sons (new list)..... dis 40 per cent
Heller Bros.' Horse Rasps dis 35
Nicholson..... dis 40
New American..... dis 40
Union File Co..... dis 40

Grindstones.

Beroa.....1@1¼ ℔ lb
Ohio.....1¼@1⅞ ℔ lb
Nova Scotia.....1¼@1⅝ ℔ lb
Lake Huron.....1@1½ ℔ lb

Hammers.

Maydole's .....dis 15
Cheney's.....dis 25
Hartford Hammer Co....dis 20
Humason & Beckley.....dis 50
Verree.....dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis25&10
Nelson Tool Works..dis 40&10
Warner & Noble's .....dis 5
Kip's.....dis 15

Hatchets.

Buckeye.....Shingling,
Nos...1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 40
Claw,
Nos...1, 2, 3,
℔ doz $8 25, $8 75, $9 25, dis 40
Lathing,
Nos.....1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 40

Hinges.

Champion double acting spring hinges.....dis. 30
Screw & Strap 8@12 in...$5. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10
Clark & Co.....70&10

Locks.

Whipple Mfg Co..... 50 &10
Norwalk Lo Co.....45&10&10

Nails.

10 to 60d	$2 85
8 and 9d	25
6 and 7d	50
4 and 5d	75
3d	1 50
2d	2 75
3d fine	3 00
2d fine	3 75
⅜ inch	3 00
4d barrel	1 00
1¼ inch barrel nails	1 50
1½ do do do	1 75
1 do do do	2 50
¼ do do do	3 00
Cut spikes, all sizes	35
Clinch nails, all sizes	1 75
Casing and box nails	75
Finishing nails,	$1 25
Tobacco nails.	50

Nuts and Washers

Nuts, square ..... 8c off list.
Nuts, hexagon.....9c. off list.
Washers.....7c off list.

Nuts, Bolts, etc.

Machine Bolts .....dis 70
Bolt Ends ..... dis 70
Boiler Patch Bolts.....net list

Picks.

Railroad, 4 to 5 lbs.. doz $6 60
5 to 6 lbs.. 7 20
to 7 lbs.. 7 80
7 to 8 lbs.. 8 40
Railroad Tamping Pick.. 7 to 8 lbs..doz 10 80
Mill Picks per lb..... 75c

Planes.

Ohio Tool Co .....dis 20
Sciota .....dis 25
Bailey's Pat. Adjstbledis 20@10
Sandusky, fancy .....dis 15
Buckeye .....dis 20
Ogontz .....dis 25

Rivets.

Iron .....dis 40
Tinned.....dis 40
Copper .....dis 50

Rules.

Stanley..... ....dis. 70 & 10

Squares. D.s

Steel or iron, case lots.....50
Try squares and T bevels....40

Spikes—WROUGHT

All lengths by ¼ inch .....4 c
do do do ⅝-16 3¼
do do do ⅜, 7-16 & ½ in 3

Shovels and Spades.

Ames' new list, July 1, 1881,.....dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Bishop .....dis 50
Chisholm.....dis 25@30
Rowland's .....dis 50
Griffiths... .....dis 50

Sad Irons.

From 4 to 10 lbs.. per lb 3 net
Self-Heating.....℔ doz $9 net
Tailors..℔ doz $18 net
Gleason's Shield and Toilet .....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott's Irons, square back.....dis 35
Enterprise Star Irons....dis 35
Combined Fluter and Sad Iron.....℔ doz $15, dis 15

Saws.

Disston.....dis 20
Disston's Circular .....dis 40
Disston's hand panel, rip, &c.....dis 20
Boynton's lightning cross cut new list .....dis 40
Boynton's circular and mill.....dis 40
Boynton's ice.....dis 25
Boynton's lightning hand panel and rip .....dis 25
Livingston's butcher and kitchen .....dis 20
Livington's framed wood Nos. 101 102 103 104 105 doz $10 8 50 10 7.50 6.20 net
Peace circular & mill...dis 40
Peace hand panel and rip .....dis 25
Peace band saws, all widths.....dis 10

Scales.

Hatch, Counter, No. 171.....
℔ doz. $42, dis 37½&10
Union Platform.....$6, dis 45
Fairbanks' .....dis 20
Buffalo Scale Co.....dis 40
Forsyth Scale Co.....dis 25
Howe's.....dis 20&10
Chatlilon's Eureka.....dis 25
Family Un versal.....dis 50
Scale Beams.....dis 33⅓&10

Screws. Dis

Flat head iron or steel [new list] per cent dis. 55
Flat head brass..... 55
Round head iron or steel 50
Round head brass..... 45
Brass and Silver capped. 30
Japanned, list of Plain Screws..... 40
Coach, patent Gimlet point, list per 100..... 65
Lag, taper points..... 70
Bed..... 10
Machine, flat head, iron. 55
round head, iron 50
Bench, iron..... 55&10
wood, beech, per doz $3..... 10
wood, hickory .....20&10

Tinners' Tools & Machines

Machines (P. S. & W.) ... less 10
Tools (P. S. & W.) ..... " 20

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe dis 70&10
Malleable Iron Fittings.... 20
Grey Iron Fittings .... dis 50
Steam Brass Goods.....dis 55
Water " " .....dis 50
Ludlow Gate Valves ...dis 20
Register Gauge Cocks net 1 00
Montg'ry Gauge Cocks $1 each
Steam Gauges.....dis 40
Steam Guages 5 in. net dial per doz..... 30 00
Scotch Glass Tubes.....dis. 70
Tools..... special.
Duplex Injectors..... net.
Soil Pipe & Fittings, Mott's List.....dis. 30
Sinks, Mott's List.....dis. 25
Copper Bath tubs, sinks, etc.....dis. 25
Galvanized Iron Boilers "Scaifes."..... dis. 50
Marble Slabs, Counter-sunk net per ft.....$ 1 25

Sheet and Tank Rivets.

"Norway."

All sizes.....dis. 15

Boiler Rivets—"Albany," ⅛, ¼, 11-16, and ⅝ in. diam .5 00

Valves. Dis.

Jenkins' Patent Gate Valves.35
" " Globe ..40
" Standard Packing " ..30

Vises.

Solid Box, list of July 1, '79,.....dis 45
Solid "Crown" (A. H. Hildick)....40 to 100 lb, 15c net
Solid, Peter Wright's.....15¼
Solid, Wilkinson's.....13¼
Parallel, Parker's.....dis 10
" Simpson .....dis 20
" Prentiss.....dis 15
Saw Filers, Hopkins' ℔ doz $17.50, dis 10
" Wentworth's .. 9 00
Reading.....dis 45&10
Cowell Hand Vises.....dis 20
Richardson's Vise and Anvil.....dis 25

Wrenches.

Coe's genuine..... 50
Girard Standard....dis 50 & 10
Mechanics' 10 and 10....dis. 50
P. S. & W. Mechanics dis 50&10
Agricultural.....dis 70

Wire.

Brass and Copper.....dis 30
Bright & annealed, Nos. 0 @ 18 dis 60@62½
" " Nos. 19 @ 26 dis 65
" Nos. 27 @ 36 dis 70
Coppered Nos. 0@18, dis 55@60
Galvanized, Nos. @18, market list,..... dis 45@50
Tinned, Nos. 0 @ 18, dis 45@47½
Cast steel.....dis 40
Tinned Broom Wire, Nos. 18@25.....dis 55
Annealed Fence, Nos. 8 and 9.....dis 60
Annealed Grape, Nos. 10 to 14.....dis 60
Galvanized Telegraph, Nos. 7 to 9 ..... ℔ 1
Galvanized Telegraph, Nos 10 to 11..... ℔ lb 8¼c
Galvanized Telegraph, No. 12..... ℔ lb 10¼c
Fence staples.. ℔ lb 5½@5¾c
Fence Staples, galvanized, ℔ lb 6½@6¾c
Stubs Steel Wire $6 00 to dis 30
Barb Wire, painted 6
Barb Wire, galvanized .. 7 c
Crucible Steel Ropes fro ⅜ in. at 9c to 1¼ in. at.....52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at.....33c

TINNER'S STOCK.

Tin.

Banca,.....per lb. 23½
Straits..... " 23 c
English..... " 23c
Bar..... " 24½c

Tin Plate,

IC 12x12 charcoal.....$ 6 75
IC 14x20 do 6 50
IX 14x20 do 8 25
DC 12½x17 do 7 00
DX 13½x17 do 9 00
DXX, 12¾x17 do 11 00
DXXX, 12¾x17 do..... 13 00
IC, 20x28 do 13 75
IX, 20x28 do 17 25
IC, 14x20, Best Roof.... 5 75
IX, 14x20, do 7 50
IC, 20x28 do 12 00
IX, 20x28 do 15 00
IC, 10x14 Best Coke..... 6 00
Subject to card discount.

Solder.

Half and Half, in bars....14½
No. 1 do 13½
Spelter Solder.....25

Fat Planished Sheet Iron

[A] ..... per lb 10½c
[B] ..... " 9c

Nos	10	15	21	25
to	14	20	24 & 26	
Com.	3-10	3-30	3-40	3-75
Char.	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra.

Zinc.

Sheet, cask..... 6¼c
Sheet, open..... 6¾c

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brs.

All Nos not thinner than No. 28, wider than 2 in. not wider than 14 inch 30c
All Nos to No. 28 inclusive, and widths over 14 to 20 in. inclusive 35c
All Nos to No. 28, inclusive, and widths over 20 to 30 in. inclusive 38
½c per lb advance on each No above Nos 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at 53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c pr lb. more than High Brass
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal
In Bars 48c
Sawed 51c
Planed or Polished...54c

For Slitting.

Metal in width in. to ¼ in. to No. 28, inclusive, 1c per lb., advance.
Metal, in width 2 in. to 1 in. thinner than No 28, 2c per lb. advance
Metal, in width ¼ in to ½ in. thinner than No 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths add 7c per pound.

COPPER.

Lake Ingot..... 15¼@16c
Baltimor ..... 14¾@15
Arizona..... ... 15@15¼c

Sheathing Brazier Copper, Bolts, etc.
All sizes, 16 oz. per sq. foot, and over, per lb 25c
" nd over per lb.....25c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb. 25c
Brazier's Copper, 10 oz and 12 oz. per sq. ft...per lb. 27c
Brazier's Copper lighter than 10 oz. per sq. ft...per lb. 34c
Circles less than 84 inches in diameter .... per lb. 38c
Circles 84 inches in diameter and over .....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz. per sq. ft... per lb. 24c
Bolt Copper..... per lb. 28c
Copper Bottoms per lb. 28c
No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x48 .....per sheet 6c
All other size sheets, 2½c per square foot. For tinning both sides, double the above amou.

LEAD.

Amere'n, ℔ lb..... 4¾c
Bar, ℔ lb.....5½c
Pipe, ℔ lb 6¾c dis 10 per ct
Sheet, ℔ lb 7¼c dis 10 per ct
Tin-lined pipe 15c dis 10 per ct
Block .....45c.
Chilled Shot..... 8c

Babbitt Metal.

Babbit metal, No. 3, 14 X....42
Babbit Metal, No. 2, 16 XX..46
Babbit Metal, No. 1, 18 XXX..50
Babbit Metal, C.....20
Babbit Metal, B.....24
Babbit Metal, A.....32
Dis 40 per cent.

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch..... 1 90
4½ to 6 by ⅜ to 1 inch..... 2 00
1¾ to 6 by 1¼ to 1½ inch 2 30
1¾ & 1¾ by ⅜ to ½..... 2 00
1 & 1¼ by ⅜ to ½..... 2 10
⅝ & ¾ and ⅜ by ⅜ to ½..... 2 30

Round,

1 to 1¼ inch..... 1 90
2 to 2¾ 2 10
2¾ to 3¼ 2 40
3¾ to 4 ..... 2 90
4¼ to 4¾ 3 40
4¾ to 5 ..... 3 60

Square.

1 to 1¾ inch..... 1 90
2 to 2¾ 2 10
2¾ to 3¼ 2 40
3¾ to 4 ..... 2 90
4¼ to 4¾ 3 40
4¾ to 5 ..... 3 60

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch 2 10
1 to 1¾ by ¼ and 5-16 do 2 20
½ to ⅞ by ¼ and 5-16 do 2 40
⅝ to ¾ by ¼ and 5-16 do 2 80

Half Oval and Half Round.

Wagon box iron ¼ and ⅜ 3 50
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 6 by ¼ to 3-16..... 2 70

Hoops.

1¼ to 2 , Nos 16 to 18..... 3 10
1¼ to 4 do 13 to 15..... 3 00
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24..... 3 50
No 25 to 26..... 3 70
No 27..... 3 90
No 28 ..... 4 30

English Steel.

Best cast..... ℔ lb 16c
Extra cast..... 16½c
Round machinery.. 10c
Swaged, cast 18c
Best double shear 15½c
Blister, 1st quality.. 13c
Refined tool steel.... 16½c
Spring calking ..... 7¼@7½c
German steel, best .. 11c
2d quality 10c
3d quality 9c
Sheet cast steel, 1st quality 15½c
2d quality 14½c
3d quality 12½c

American Steel.

Best brands of refined cast steel, ⅜ to 2 inches..12c
Crucible cast..... 7c
Open-hearth ditto ... 4½c
Hammer cast steel ... 9c
Spring cast steel..... ½c
Bessemer and open-hearth spring..... ½c
Ditto plow..... ½c
Steel boiler plate .... 6½@7c
Bessemer machinery .5 @6c
Spring and calking .. 7½@7c
Tire 4
Sleigh shoe..... 4

Bessemer Steel Tire.

⅝ to 1 by 3-32..... 4 ℔ lb
⅝ to 1 by ½ to 5-32 .... 4 ℔ lb
⅝ to 1 by 3-16 to ⅝ .... 4 ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit..... 10
Axle steel for wagons..... 7
Frog points and plates.....8
Frog size bars 8
Pick, hammered..... 10½
Mattock, beveled..... 9
Table cutlery..... 7½
Trap spring steel..... 10
Pike and cant hook..... 8½
Coal and granite..... 9

SCRAP IRON AND OLD METAL.

DEALER'S BUYING PRICES

	Per Ton
No. 1 R R wro't scrap....	$20
No. 1 wrought scrap.....	19
No. 1 Machine cast scrap.	14
Stove plate (free from burnt iron).....	11 00
Grate bars	7
Pipes and flues (clean)....	15
Tank iron.....	14
Hoop and band iron.....	10
Light sheet iron.....	9
Axle turnings.....15 00@16	00
Wro't turning (f from cast)	13
Wro't iron, oily drillings	9@10
Cast borings.....	9 00
Malleable iron.....	9
Uncut wro't iron boilers..	19
Old copper per lb.....	15
No. 1 H. Brass per ℔.....	11
Heavy yellow Brass do..	9@11
Light Brass per ℔.....	7@9
Scrap Zinc per ℔.....	2@3
Tea Lead per ℔	3
Heavy Lead per ℔	4

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe

Inside Diameter.	Plain, Price Per Foot.	Galvan. or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛..	08		.40	.24
¼..	08	$0 11	.54	.42
⅜..	09	12	.67	.56
½..	11	15	.84	.85
¾..	13½	19	1.05	1.13
1 ..	19	28	1.31	1.67
1¼..	27	40	1.66	2.28
1½..	33	47	1.90	2.69
2 ..	46	64	2.37	3.66
2½..	75	1 00	2.87	5.77
3 ..	95	1 30	3.50	7.55
3½..	1 25	1 70	4 00	9.65
4 ..	1 50	2 05	4.50	10.73
4½..	1 75	2 40	5.00	12.49
5 ..	2 25	3 00	5.56	14.56
6 ..	2 75	4 00	6.62	18.76
7 ..	3 75	....	7.62	23.00
8 ..	4 75	....	8.62	28.00
9 ..	6 50	....	9.68	34.44
10 ..	8 00	....	10.75	40.64
12 ..	12 00	....		54.65

Discount, car load lots, 70 and 10 per cent. Less than car load 70 to 70&5.

COAL,

WHOLESALE.

Wholesale f.o.b. cars at Cleveland:

Carbon Hill and Monday Creek	$2 50
Massillon	2 70@3 00
Palmyra, lump	3 25
Brier Hill	3 25@3 50
Pittsburgh	3 00
Salineville	2 25
Tuscarawas	2 40
New Hazelton	2 50
New Hazelton, mix	1 20
" " nut	2 00
Connotton	1 15
Connotton, mix	2 00
" nut	2 00
Anthracite grate	5 40
Anthracite egg	5 58
Anthracite stove	5 85
Anthracite chestnut	5 98

RETAIL.—Delivered.

Massillon Lump	$4 00
" Nut	3 75
Carbon Hill and Monday Creek, lump	3 50
Carbon Hill and Monday Creek, nut	3 25
Straitsville, lump	3 75
Straitsville, nut	3 50
Palmyra, lump	4 25@4 50
New Hazelton	3 50
Connotton	3 00

75c less on cars by car load.

Anthracite Stove and Chestnut	6 75
Egg and grate	6 50

OILS.

Pure Oils. p'kages included	
Sperm, winter bleached per gal	1 30@1 33
Whale, winter bleached per gal	63@66
Straits	47@50
Bank	45@47
Lard oil extra W S..	68@70
do No 1 do	55@58
do No 2 do	50@53
Tallow oil	67@70
Neatsfoot oil pure..	95@$100
do No 1	80@85
Linseed oil, raw	57@60
do do boiled	60@63
Cotton seed oil white	53@55
do do yellow	52@54
West Virginia lubricating 28 deg.....	15c@20c
Paraffine oil winter pressed.....	22@25
Capitol Cylinder.....	85
Model do	65
Eldorado Engine..	50
Turpentine, per gal..	43

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15.....	8 00
11x14 to 15x24.....	9 00
16x24 to 20x28.....	10 25
15x34 to 24x30.....	11 25
26x28 to 24x36.....	12 00
26x36 to 26x44.....	13 50
26x46 to 30x50.....	14 58

DOUBLE THICKNESS Dis60&20

6x8 to 10x15.....	13 25
11x14 to 15x24.....	13 75
16x24 to 20x28.....	16 25
15x34 to 24x30.....	17 75
26x28 to 24x36.....	19 00
26x36 to 26x44.....	20 78

Dis. 70

Coal Trade of Principal Cities.

The coal business done at some of the most important cities in the Union in the year 1882 is given below:

	Gross tons of 2,240 pounds.
New York city	6,000,000
Buffalo, N. Y.	3,031,791
Boston, Mass	2,106,870
Brooklyn, N. Y.	1,600,000
San Francisco, Cal.	882,896
Providence, R. I.	821,837
Jersey City, N. J.	500,000
	Net tons of 2,000 pounds.
Chicago, Ill.	3,852,070
Baltimore, Md.	2,200,000
Cincinnati, O.	2,197,407
Cleveland, O.	1,922,595
St. Louis, Mo.	1,910,015
Toledo, O.	1,782,810
Louisville, Ky.	750,000
Erie, Pa.	700,000
Kansas City, Mo.	420,731
Milwaukee, Wis.	400,000
New Orleans, La.	300,000
Duluth, Minn.	264,688
Richmond, Va.	215,903
Mobile, Ala.	25,000

THE New York Public in a review of the pig iron trade for 1883, showed that although the number of furnaces in operation were less than last year, the product for the first six months of 1883 was 2,351,019, tons in the United States, which was 40,357 tons more than for the same period in 1882. An extraordinary demand of iron for building purposes is credited with keeping the market steady.

A tool after it has been forged, should be so hardened or tempered that it will never want to come to the fire again until it is so worn down that it requires reforging. This acomplishes two things: First, it saves the time lost in the second hardening; and in the second place, it avoids the damage always done to the cutting power by rehardening without forging.

THERE is talk of bridging the Mississippi river at New Orleans, where the river is 2,400 feet wide; estimated cost $13,000,000.

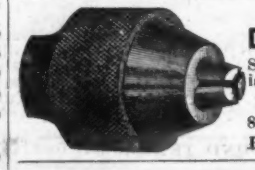
DEAD-STROKE

Power Hammers.

Construction Improved. Seven Sizes. 5 to 250 Pounds. Over 600 in Use. Price reduced March 1st.

The 15 and 25 pound sizes are specially adapted for Filemakers' use, the other sizes for general forging. Send for circular and references.

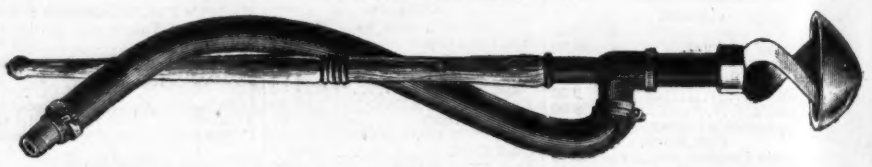
DIENELT & EISENHARDT,
MAKERS,
1306 Howard Street, Philadelphia.



ALMOND
DRILL CHUCK.
Sold at all Machinists' Supply Stores.
T. R. Almond,
84 Pearl street, 8
BROOKLYN, N. Y

CLEVELAND TWIST DRILL CO, COX & PRENTISS, 24 and 26 West Street, Cleveland, O., and 101 Chambers St., N. Y.

The Cyclone Boiler and Flue Cleaner,
Gerlach's pat. June 5, 1883.



The auger shaped steam passage gives the steam a spiral motion the entire length of tubes, thereby thoroughly cleaning a set of tubes in 5 minutes.
Improving the draft, saving fuel and labor.
No steam user should be without one.
Circulars free, liberal discount to dealers.
98

CRESCENT MANUFACTURING CO.
5 Michigan street, Cleveland, O.

THE NEW PULSOMETER

The cheapest, strongest, most simple, compact, durable, effective and economical
STEAM PUMP IN THE MARKET,
for raising liquids under and up to 100 feet. No Machinery, No Oil, No Special Care. Can be worked suspended by a chain. Will pass grit, mud, sand, pulp, etc., without injury to its parts. Needs only a steam pipe from boiler to run it. Price, 600 gallons per hour, $50; 1,200 do. $75; 3,600 do. $100; 6,000 do. $150; 10,000 do. $175; 18,000 do. $225; 25,000 do. $275; 45,000 do. $400; 60,000 do. $500; 120,000 do. $1.0 0. Compare this with any other Pump List.
Write for illustrated descriptive book with testimonials, &c. *Mailed free.*
PULSOMETER STEAM PUMP CO., 83 John St., New York City, U. S. A.

The American Tool and Machine Company.,
84 Kingston street, Boston Mass.,
—Manufacturers of the—
Celebrated Cabinet Turret, Screw Chasing, and Hand Lathes,
CHUCKS, SLIDE RESTS,
And Valve Milling Machines for Brass Finishers.
Also the D. M. Weston Hydro Extracters
For Woolen and Cotton Mills, Hotels, Laundries, etc.
30 BENJAMIN F. RADFORD, Supt.

HERBERT BAKER,
MANUFACTURER OF
WOOD-WORKING MACHINERY.
SINGLE & DOUBLE ROTARY BED PLANERS,
Buzz Planers, Saw Benches,
AND SPECIAL MACHINERY OF ALL KINDS.
—GENERAL DEALER IN—
WOOD AND IRON-WORKING MACHINERY.
TOLEDO, - OHIO. 71

WM. SCHAKE,
MANUFACTURER OF
BLANK BOOKS.
All kinds of RULING, EMBOSSING and GILT EDGING and BINDING to order.
LARGE WORK AND FINE BINDING A SPECIALTY.
Send for estimates. All work Guaranteed.
147 St. Clair Street, 84 e o w Cleveland, O

E. Fawcett & Son
ALLIANCE, O.,
Manufacturers of
HIGH SPEED
Engines
For Electric Lights,
AND
DIRECT ACTING
HIGH SPEED
Portable
Saw Mills.
Send for prices.
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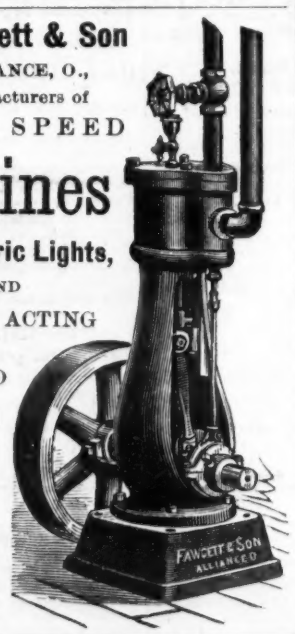
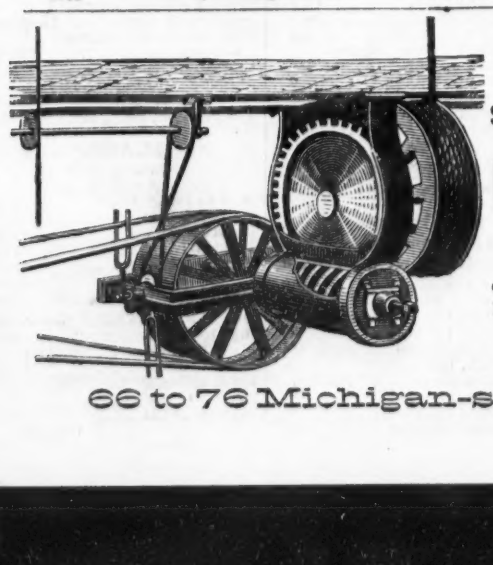
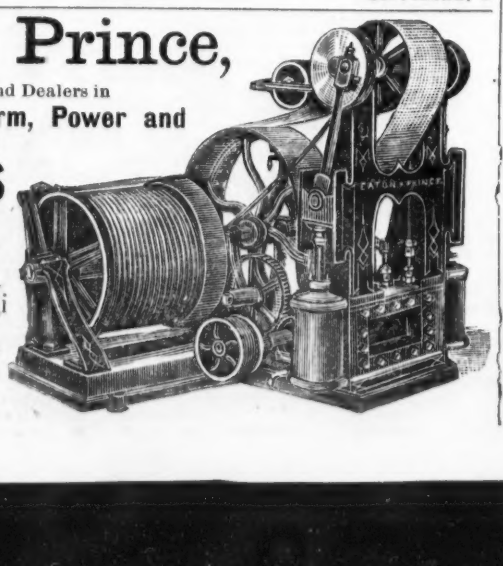


PECK'S PAT. DROP PRESS
BLAST FORGES.
STEEL & IRON DROP FORGINGS
Drop Dies and Special Machinery.
BEECHER & PECK, NEW HAVEN CONN.

F. I. FREEMAN, Prop. JAS. GILLETT, Mangr.
THE
Ætna Machine Works,
Manufacturers of
High and Low Speed
Stationary Engines
BOTH
UPRIGHT AND HORIZONTAL
Geared and Direct Attachment
CIRCULAR SAW MILLS.
STEAM PUMPS,
IRON AND BRASS CASTINGS.
Patent Sets and Head Blocks for Saw Mills, and Machinery of all descriptions. I now have the agency for the celebrated
Watertown Portable Engines & Boilers,
and can supply customers with anything in this line at very low prices.
Call at Works and see them in Stock.
Also manufacturers of
The Ætna Engines.
These are an entirely new style of Upright Engines, designed by F. I. Freeman, and
PATENT APPLIED FOR.
They are so constructed that they can be sold for one-half the price for the ordinary style of the same sizes or power, consequently they are by far the
Cheapest Engines in the Market
And are warranted satisfactory in every respect. They are designed especially for Saw Mills, Grist Mills and Hoisting Machines, and are high or low speed engines, running from one to seven hundred revolutions per minute; are strong and heavily built, of the best material and workmanship.
☞ Parties interested will find one in operation at the works. Call and examine for yourselves. Sizes range from eight to one hundred horse power.
Also dealers in Gas and Pipe Fittings, Globe Valves, and
Second-hand Machinery of all kinds
Prompt Attention given to Repair Work.
☞ Parties wishing to buy or sell second-hand Machinery will do well to call.
Corner Vernon and Hudson Streets,
(Opposite N. Y. P. & O Freight Depot.
WARREN OHIO.

Eaton & Prince,
Manufacturers and Dealers in
Steam, Hydraulic, Worm, Power and
HAND, FREIGHT & PASSENGER
ELEVATORS
—AND—
Steam Hoisting Engines
Shafting, Pulleys, Hangers, General and Special Machinery.
For Blast Furnaces, Iron, Coal and other Mines.
Send for Catalogue and Price List.





66 to 76 Michigan-st., Chicago. 72

Address, TAYLOR MFG. CO., Chambersburg, Pa.
(Please Mention this Paper.)

ECLIPSE ELECTROTYPE AND ENGRAVING CO.
147 ST. CLAIR ST.
CHAS. W. DEAN. CLEVELAND, OHIO.

TRAVELER'S REGISTER.

Lake Shore & Michigan Southern.

TRAINS GOING EAST.	Arrive. From West.	Depart. From East.
Fast N. Y. Express	*1 35 a m	*1 50 a m
N.Y.,Bo't'n & At. Ex.	*7 05 a m	*7 30 a m
Elyria Accommodation	†8 35 a m	.....
Pt.Clinton Accom'd'at'n	†11 00 a m	.....
Buffalo Accommodation	†11 00 a m	†11 15 a m
N. Y and B't'n Fast Ex.	*2 25 p m	*2 55 p m
Conneaut Accom'dation	.....	†4 50 p m
Night Express	†10 10 p m	†10 35 p m
TRAINS GOING WEST.	**Arrive. From East**	**Depart. From west.**
Fast Limited Express	*12 23 a m	*12 33 a m
Mich. Ex. via Sandusky	*2 50 a m	*3 05 a m
Chi Ex. via Sandusky	†6 35 a m	7 00 a m
Mich. Ac. via Norwalk	.....	†6 40 a m
Conneaut Accom'dat'n.	†8 40 a m	.....
Toledo Ex. via Norwalk	†1 25 p m	†3 30 p m
St. Louis Ex. via San'ky	*1 40 p m	*2 05 p m
Chi. Pac.Ex. via Nor'lk.	*7 05 p m	*7 35 p m
Pt.Clinton Accom'dat'n	.....	†5 00 p m

Sunday trains for Nottingham—Depart 0:00 a. m. and 2:15 p. m., return at 10:05 a. m. and 4:45 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

Cleveland, Columbus Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex.	*7 10 A.M
No. 8 C. L. & W. and Galion Exp.	9 30
No. 12 St. Louis & New York Exp.	*3 20 P.M
No 6 Indianapolis & Columbus Exp	10 00
No 4 Columbus & Cincinnati Exp.	*3 50
No. 10 Wheeling Express	7 15
No. 14 Cincin. New York fast line,	1 40 A.M

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	*8 00 A.M
No. 11 Cleve. Indianap. & Wheel'g Ex	7 10
No. 3 Special St. Louis & Cin. Ex.	**2 15 P.M
No. 5 Night Express,	*7 10
No. 7 C. L. & W. and Galion Exp	5 00
No. 17 Spec. Col. Cin'ti. Exp.	1 50

**This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Lorain & Wheeling.

ARRIVALS.

Wheeling & Cleveland Express	7 15 P.M
Uhrichsville Express	9 30 A.M

DEPARTURES.

Wheeling & Cleveland Express	7 10 A.M
Uhrichsville Express	5 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 1 New York Expaess	* 6 40 a.m.
No. 7 Mahoning Valley Ac	11 55 a.m.
No. 5 Fast N. Y. & Pitts. Ex	* 1 40 p.m.
No. 3 N. Y. & Pittsburgh Ex	* 7 05 p.m.
No. 9 Youngstown & Pitts. Ac	10 15 p.m.

DEPARTURES.

No. 12 N. Y. & Pitts. Express	* 7 20 a.m.
No. 6 Youngstown & Pitts Ac	11 05 a.m.
No. 4 Fast N. Y. & Pitts. Express	* 2 50 p.m.
No. 2 Mahoning Accommodation	4 35 p.m.
No. 8 N. Y. and Pitts. Express	11 05 p.m.

* Sunday trains.

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Pittsburg & Wheeling	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Alliance Accommodation	10 10 A.M	3 45
Ravenna Accommodation	8 37	5 30
Night Express	6 25 A.M	†11 40 P.M
Newberg Accom'dation	12 10 P.M	11 00 A.M
Newberg Accom'dation	1 50 P.M	12 30 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

	ARRIVE.	DEPART
Wheeling Junction	10 15 A.M	8 30 A.M
Canton	1 35 P.M	6 15 P.M
Wheeling Junction.	6 15 P.M	3 20 P.M

Special trains leave on Sunday at 4.20 P.M., arriving at Cleveland at 7.15 P. M.

Depot foot of South Water Street.

Connotton Valley Railway.

Trains leave Cleveland,	A. M.	P. M.
Canton & Sherrodsville	*7 30	2 30
Canton, Coshocton & Sherrodsville		2 30
Canton & Coshocton	7 30	4 10
Kent accommodation	*10 35	8 00
Trains arrive:	A. M.	P. M.
Canton & Sherrodsville	10 15	
Canton & Coshocton		1 25
Canton, Coshocton & Sherrodsville		*7 30
Kent accommodation	*8 05	7 50

Newburgh depart at 8:05 a. m., 11:20 a. m., 6:15 p. m.; Newburgh and Bedford depart at 11:00 p. m.

Newburgh arrive at 8:55 a. m., 4:45 p. m., 7:00 p. m.; Newburgh and Bedford arrive at 6:45 a. m.

Trains run daily except Sundays. *Trains daily. Depot corner Huron and Ontario streets.

Cleveland, Akron & Columbus Railroad.

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Rail road to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Accommodation	10 10 A.M	3 45 P.M

"The Nickel Plate."

	ARRIVE.	DEPART
Local Passenger	10 00 P.M	3 48 P.M
Local Passenger	9 18 A.M	6 55 A.M
Conneaut Accom'dation	9 05 A.M	4 30 P.M

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

Formerly Atlantic & Great Western Railroad]

For New York, Boston and the East. The, shortest and quickest route to Pittsburgh Washington, Baltimore and the Southeast.

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7 20A.M. LIGHTNINGEXPRESS (daily) sleepingand hotel coaches from Leavittsburg, 9:05 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p. m.; Buffalo, 6:15 p. m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p. m. (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m. Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

2:50P.M. LIMITED EXPRESS, Pull-(daily). Sleeper Cleveland to New York. Arrives at Meadville, 6:55 p m.; Jamestown, 9;13 p. m.; Salamanca, 10:10 p. m.; Now York, 10:25 a. m.

11:25 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsurg to New York without change. Arrives at Youngstown, 1:45 a.m.; Pittsburgh, 6:15 a. m.; Washington 9:15 a. m. Baltimore 10:34 p. m.; Meadville, 3:50 a. m. Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a. m.; Rochester, 1:10 p. m.; Hornellsville 1:20 a. m.; Corning, 12:53 p. m.; Elmira 1:21 p. m.; Binghampton, 2:50 p.m.; New York 9:25 p.m.

2:50 P.M. PITTSBURGH EXPRESS, daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:19 a.m.

4:35 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p. m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:20 A.M. PITTSBURGH EXPRESS, —(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p. m. and 4:20 p.m.

11:05 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:40 a.m., 7:05 p. m., 10:55 a. m 1:40 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK,
Gen. Pass'r. Agt., Cleveland, Ohio.

M. L. FOUTS,
J. M. FERRIS, Pass. Agt., 131 Bank st.,
Gen. Man'gr, Cleveland Cleveland.

TIME TABLE.
CLEVELAND & PITTSBURGH
RAILROAD.

On and after Sunday, January 21st, 1883, trains depart from and arrive at Union Station, Cleveland, (city time) as follows:

DEPART.

For the East--8:20 A.M.; 1:55 P.M., 11:35 P.M
For Alliance--3:40 P.M.
For Ravenna--5:25 P.M.
For Newburgh--10:55 A.M; 12:25 P.M.
On Sunday for the East, at 11:35 P.M.

Train leaving for the East (week days) at 1:55 P.M. has sleeping car through to Philapelphia and New York.

Train leaving for the East every night at 11:35 has sleeping car to Pittsburgh.

On Saturday night the train for the East leaving Cleveland at 11:35 runs from Alliance to Pittsburgh via P.F.W. & C. Railway.

ARRIVE--(Week Days.)

From the East--6:20 A.M.; 2:25 P.M.; 7:25 P.M
From Alliance--10:05 A.M.
From Ravenna--8:32 A.M.
From Newburgh--12:05 P.M.; 1:45 P.M.

Time tables, rates of fare, through tickets and further information can be obtained from M. G. Carrel, agent, Union Station, or C. L. Douglass, No. 212 Bank street.

WM. A. BALDWIN, Manager, E. A. FORD, Gen. Pass. Agt. Pittsburgh, Pa.

Bee Line.

Cleveland, Columbus, Cincinnati & Indianapolis Railway.

The Great Central Trunk Route to the Ohio and Mississippi Rivers.

Three Trains Week Days,

TWO TRAINS SUNDAY.

Leave Cleveland with Through Palace Coaches and Elegant Sleeping Cars for

Columbus, Cincinnati, Indianapolis, Terre Haute and St. Louis

Without Change.

This is the only line making Direct Connection with all the principal Trunk Lines of the East for all Southern, Southwestern and Western points, either by way of Cincinnati, Indianapolis or St. Louis for all railway towns in Missouri, Arkansas, Texas, Kansas, Nebraska, Colorado, New Mexico, Old Mexico and the Pacific Coast.

Equipment New and Comprising all Modern Improvements.

The Best Roadbed and Safest Road in the West.

Tickets by this popular route for sale at all regular ticket offices.

E. B. Thomas, General Manager. **O. B. Skinner,** Traffic Manager.

A. J. Smith, Gen'l Pass. Agent, CLEVELAND, O.

Blue Grass Route of Ohio

TIME TABLE.

In effect July 16, 1883.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

SOUTH-BOUND TRAINS.

	Mail.	Expr'ss.	Acc'm	Acc'm
Leave.				
Cleveland	8 25 am	2 30 pm	3 45pm	.....
Hudson	9 40	3 35	5 00	.....
Cuyahoga F's.	9 58	3 53	5 24	.....
Akron	10 14	4 08	5 40	.....
Clinton	10 45	4 44	6 11	.....
Warwick	10 50	4 49	6 16	.....
Orrville	11 14	5 15	6 40	.....
Fredricksburg	11 45	5 46	7 13	a. m.
Millersburg	12 08 pm	6 08	7 35 ar	5 25
Gann	15 55	6 58	.....	6 15
Danville	1 07	7 09	.....	6 26
Gambier	1 27	7 29	.....	6 46
Mt. Vernon	1 55 D	7 54	.....	7 15 B
Centerburg	2 26	8 27	.....	7 50
Westerville	2 10	9 10	.....	8 38
Columbus arr.	3 35	9 35	.....	9 05

NORTH-BOUND TRAINS

STATIONS.	Expr'ss.	Mail.	Acc'm	Acc'm
Leave				
Columbus	7 10 am	12 10 pm	.....	5 20 pm
Westerville	7 35	12 34	.....	5 48
Centerburg	8 17	1 16	.....	6 33
Mt. Vernon	9 02 B	2 00 D	.....	7 19 S
Gambier	9 14	2 11	.....	7 29
Danville	9 34	2 29	.....	7 49
Gann	9 46	2 40	.....	8 01
Millersburg	10 38	3 27	5 45am	8 50 arr
Fredricksb'g	11 00	3 47	6 06	.....
Orrville	11 33	4 17	7 10 B	.....
Warwick	11 56	4 39	7 37	.....
Clinton	12 02 pm	4 44	7 46	.....
Akron	12 35	5 14	8 20	.....
C'yahoga F's	12 50	5 26	8 33	.....
Hudson	1 10	5 48	8 53	.....
Ar. Clevel'd	2 25	6 55	10 10	.....

B Breakfast. D Dinner. S Supper.

N. MONSARRAT, Gen'l Supt. Akron, O
E. T. AFFLECK, General Passenger Ag't, Columbus, O.

THE NICKEL PLATE.

New York, Chicago & St. Louis Railroad.

The passenger equipment of this new trunk line is all new and is supplied with the latest appliances necessary to safe, speedy and comfortable travel.

At Chicago, Passenger Trains arrive at and leave Union Depot, Van Buren street.

Following is the time in effect Sept. 9, 1883, and until further notice:

GOING EAST.

	L Pass'n'gr	Loca Pass'ngr.	
Lv. Chicago	8 15 am	.....	.....
Ar. Valparaiso	10 05	.....	.....
" Ft. Wayne	1 30 pm	.....	.....
" New Haven	2 05	.....	.....
" West Leipsic	4 15	.....	.....
" Arcadia	5 12	.....	.....
" Fostoria	5 25	.....	.....
" Gr. Springs.	6 12	.....	.....
" Bellevue	6 40	.....	.....
Lv Bellevue	6 55	8 30 am	.....
Ar Cleveland	9 30 pm	11 00	.....
Lv Cleveland	.....	11 05	4 20 pm
Ar Painesville	.....	12 11 pm	5 32
" Ashtabula	.....	1 18	6 28
" Conneaut	.....	1 50	6 55
" Erie	.....	2 51	.....
" Dunkirk	.....	4 25	.....
" Buffalo	.....	6 00	.....

GOING WEST.

	Local Passn'gr.	Local Pass'ngr.	Con'eaut Accom.
Lv Buffalo	10 15 am	.....	.....
Ar Dunkirk	11 56	.....	.....
" Erie	1 50 pm	.....	Leave.
" Conneaut	2 50	.....	6 45 am
" Ashtabula	3 17	.....	7 14
" Painesville	4 11	.....	8 11
" Cleveland	5 20	.....	9 25
Lv Cleveland	5 25	7 15 am	.....
Ar Bellevue	7 55	9 30	.....
Lv Bellevue	.....	9 40	.....
Ar Gr. Springs	.....	10 07	.....
" Fostoria	.....	10 46	.....
" Arcadia	.....	11 00	.....
" West Leipsic	.....	11 55	.....
" New Haven	.....	2 05 pm	.....
" Ft Wayne	.....	2 20	.....
" Valparaiso	.....	6 23	.....
" Chicago	.....	8 20	.....

ROCKY RIVER ACCOMMODATION.

Departs 7:50 a. m., daily; 9:25 a. m., daily; 10:55 a. m., Sunday only; 1:43 p. m., daily; 4:25 p. m., Sunday only; 7:00 p. m., Sunday only.

EUCLID ACCOMMODATION.

Departs 12:20 p. m., daily; 5:45 p. m., daily, except Sunday; 8:35 p. m., Sunday only.

Trains run by Columbus time, which is twenty minutes faster than Chicago, five minutes slower than Cleveland, and sixteen minutes slower than Buffalo time.

For information, call on nearest Agent of the Company or address

B. F. HORNER, Gen'l Passenger Agent,
LEWIS WILLIAMS, General Manager, Cleveland O

SAFETY STEAM, WATER & HAND POWER
GIVE HATCH SIZE, ELEVATION OF **ELEVATORS.**
BUILDING, & SEND FOR ILLUSTRATED CIRCULAR.
C. H. MITCHELL & CO.
105 MICHIGAN ST CHICAGO.

A. Northrop & Co.,

NORTHROP'S PATENT CAP SEAM

SHEET IRON ROOFING.

PATENT

PANELED SHEET IRON CEILING,

And CRIMPED IRONS of various designs for Roofing and Siding.

No. 97 First Avenue,
PITTSBURGH, PA.

☞ Send for Circular. 81

Beaver Falls Steel Works.

BEAVER FALLS, PA.

Manufacturers of all kinds of STEEL. Special "Beaver" Tool, Die, and Axe Steel, Iron Center, Soft Steel Center, and Cast Plow Steels. Open Hearth Bessemer Agricultural Steel Shapes. Finished Rolling Coulters and Patent Cutlery Steel. 82

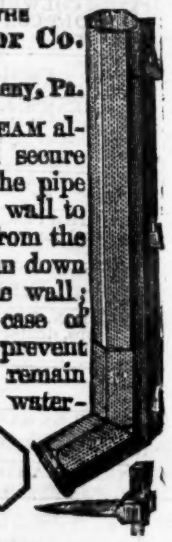
The ***IRWIN & REBER*** PATENT

Expanding Water Conductor

MANUFACTURED BY THE

S. S. S. Conductor Co. LIMITED,

47 Federal St., Allegheny, Pa.



THE STANDING SEAM allows of an easy and secure fastening, keeping the pipe far enough from the wall to make any overflow from the eave pipe or head, run down the spout, and not the wall; and will open, in case of freezing, so as to prevent bursting, and still remain double-locked and water-tight.

PRINCIPAL AGENTS.

E. B. Badger & Son, Boston, Mass.; Noyes & Wines, New York; J. S. Thorn, Philadelphia; John G. Hetzell, Baltimore, Md.; R. P. Gormully, Chicago; F. Schmidt & Sons, Milwaukee; Shackelton Bros., Cleveland; Patterson & Hayes, Erie, Pa.; G. H. Peters & Son, Buffalo, N. N.; James Ackroyd, Albany, N. Y.; Witt & Brown, Cincinnati,; Hull & Cozzens, Mnfg Co., St. Louis, Mo., and many others.

THE WATERS

STEAM ENGINE GOVERNOR.

—The—
Only Governor Perfectly Suited to every Variety of Stationary and Portable Steam Engines.

Warranted suit or no sale.

Manufactur by

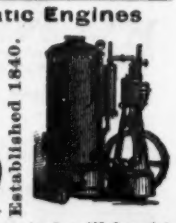
Edward Dewey & Co.,

34 OLIVER STREET, BOSTON, MASS.

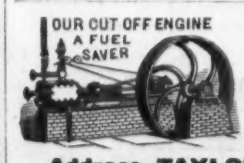
☞ Send for Circulars. 43

Payne's Automatic Engines

Established 1840.



Reliable, durable and economical, will furnish a horse power with ⅓ less fuel and water than any other engine built, not fitted with an automatic cut-off. Send for illustrated Catalogue No. 20 for information and prices. B. W. PAYNE & SONS, Box 1436, Corning, N. Y.



Address, TAYLOR MFG. CO.

(Please Mention this Paper.) Chambersburg, Pa.

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W. E, Ana ytical Chemist, 31 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & UPSON MANUFACTURING CO. Manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws. 15

Boiler Makers.

SMITH & TEACHOUT— (Established 1857.) Boiler, Tanks, Stills etc. 644 Broadway.

Bridge and Boiler Builders.

BUCKEYE BRIDGE AND BOILER WORKS, mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave.

Coal, Iron and Ore.

ANDREWS, HITCHCOCK & CO., Briar Hill, Coal and Pig Iron. 101 St. Clair St. 81

JACKSON IRON CO. Iron Ore and Pig Iron. Fayette Brown, Gen. Agent. 101 St. Clair street. 15

RHODES & CO. Coal, Iron Ore and Pig Iron. 101 St. Clair street. 1

DALLIBA, J. H., Iron Ore. Grand Arcade Building, 101 St Clair st. 51

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts. 41

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection. 41

Dyers.

BICHLMYER, A., 122 Seneca st. Gentlemen's and Ladies' Clothes Cleaned and Dyed. 74

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws. No. 11 South Water street. 51

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins. 74

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st. 61

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way. 63

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway. 64

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street. 33

Hardwood Lumber.

MARTIN & BARRIS, dealers in all kinds of Hardwood Lumber. 130 Central Way. 51

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manufacturers of Steel and Iron Wire and Steel Tire. 34

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st. 4

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed umber, timber, lath, shingles, etc. 47 Central Way. 83

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets. 04

Lime Manufacturers.

RUSSELL LIME CO,, manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street. 34

Machinery and Boilers.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street. 71

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO. manf'rs of lubricating oils, 23 Euclid ave, 84

Stair Builder.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio. 41

Cleveland Business Directory.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street. 54

Steam Furnaces.

CUYAHOGA STEAM FURNACE CO., Manfrs of Land and Marine Engines, Machinery for Blast Furnaces, Rolling Mills, Bessemer Steel Works, &c. Mill-Gearing and all kinds of Castings, Foundry, Machine and Boiler Shops. 53

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample trunks and Cases a Specialty. 56 Public Square 54

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. Arcade Building. 101 St. Clair Street. 72

Business Directory.

Akron, O.

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc. 04

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street. 84

CAHOW BROS. manfrs. of and dealers in Wood and Metal Pumps, Pipe, etc. 225 West Market street. 42

MAY & FIEBEGER, Galvanized Iron Cornices. Send your plans for estimates. 62

Alliance, O.

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing, 41

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling machines, foot & power lathes, 70 Columbia st. 33

EMPIRE STATE MF'G CO., O. F. Swift, prop'r, manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio. 83

WHITE, L. & I, J. manf'r's of Coopers' Tools. Carpenters' Tools, and Ship Tools. Also manf'r's of Planer Knives and Machine Cutters to order 310-314 Exchange street. 33

THE BUFFALO NUT AND BOLT CO.—[Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. 226 Ohio St. 31

Bridgeport, Ct.

ATLANTIC HOTEL, directly opposite the Railroad Depot. D. Foland, proprietor. W. Foland, H. W. Terrell, Clerks; Wm. Richardson, Night Clerk. 2

Canton, O.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc. 73

BELDEN BURNER CO.—H. S. Belden—B. C. Goodrill. 158 and 160 S. Market-st., Manfrs of gasoline burners and fixtures, and contractors for lighting streets. 2

THE SUN VAPOR LIGHT & STOVE CO., manufacturers of Vapor Gas Lights, Gasoline Stoves and Tinner's Soldering Furnaces. Contractors for lighting the streets of cities and towns. No. 116 E. 5th Street 72

Columbus, O.

REYNOLDS BROS., manufact'rs of hand-cut Files and Rasps. Old files re-cut. Send for Price List. 11

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co. 03

ZELOTES WOOD & CO., manfrs of Malleable Iron. Cor. Randolph and West streets. 13

Cuyahoga Falls, O.

SNYDER, H. wholesale manufacturer of Sash, Doors, Blinds, &c. Send for Price Lists. 71

THE CUYAHOGA FORGE AND IRON CO. manfrs. of every description Car, Truck & Driving Axles, Forging, Shafting, 71

Cincinnati, O.

THE CINCINNATI STEAM HEATING CO. mfrs, dealers and contractors. Warming and Ventilation of public and private buildings a specialty. Boilers, Radiation, Pipe, Fittings, Brass Goods, &c. Correspondence solicited. 187 West Pearl street. 92

Erie, Pa.

BALL ENGINE CO., manufacturers of Automatic Engines of 15 to 60 horse power.

Geneva, O.

THE ENTERPRISE MACHINE CO., Y. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of all kinds. 43

Business Directory.

Niles, O.

REEVES Bros., Manufacturers of Boiler, Tank and Sheet Iron work, etc. 64

Olean, N. Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc. 72

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and iron castings, light and heavy, made on short notice. 2

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42½ Sixth Street. [Up stairs.] 17

Painesville, O.

NORTH AMERICAN CUTLERY CO., manufacturers of Steel Shears and Scissors—best quality. 8

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect streets. 51

Rochester, N. Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mall, chisels, &c. 23

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. Graham & Co. 43

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List. 2

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street. 71

TOLEDO FOUNDRY AND MACHINE CO builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry. 03

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Corner Water and Lagrange streets. 84

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description. All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss, Springs, &c. made to order. 92 St. Clair St. 3

UNION Manufacturing Co., manufacture Sewing Machines, Wash-boards, Children's Wagons, Carts, Wheelbarrows, Sleds, Kitchen Wooden ware, &c. 3

BOAT BUILDING: Hepburn Bros., prop. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street, foot of Cherry. 3

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pullies, Shafting, &c. Cor. 18th & Chapline streets. 12

Youngstown, O.

BELL, EDWIN & SONS, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock. 1

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath. 1

Improved Joint

FOR GLASS, ETC.,
FOR ROOFING HOT-BEDS
GREENHOUSES, ETC

Applicable to Vertical or Inclined Surfaces, with thick glass, slate or tile,

Making the Roof Impervious to Water, Dust, Cold or Snow.

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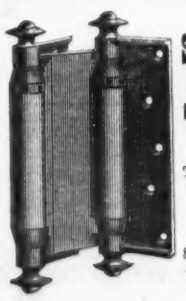

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has the lightest and

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READY for IMMEDIATE DELIVERY

Two Speed Lathes, 13¼ inches x 4 ft. with 12-inch slide rests.

Two 13¼ inch x 4 ft. Turret Lathes, with cut off and automatic chucks.

One 2 inch Cast Steel Bolt Cutter Head, with full set of dies from ¼ to 2 inches.

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MALLEABLE IRON WORKS

of Akron. Two large Annealing Ovens with equipments for same; Japanning and Tinning Rooms; good Boiler and Engine of 25-horse power; machine and store house two stories, 25x50 feet, containing pulleys, hangings, benches, polishing barrels, etc.; Moulding Foundry 50x70 feet, including cupola, ladles, crane, core-oven and air-furnace with a fine high stack.

Four buildings and one acre of ground well located. Shipping facilities the very best. Buildings and machinery all nearly new. The whole will be sold at a bargain and on reasonable terms of payment. Enquire of

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The Engines are mounted on an A frame, bolted to a strong bed-plate, and by the side of the boiler, but not dependent upon the boiler, making the most convenient double engine, taking up less space, and can do more and better work than any other of the same dimensions.

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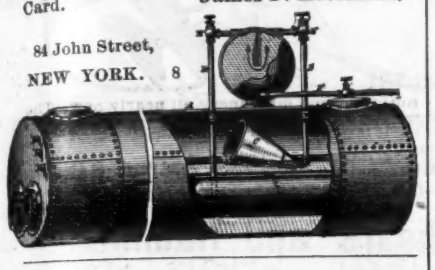
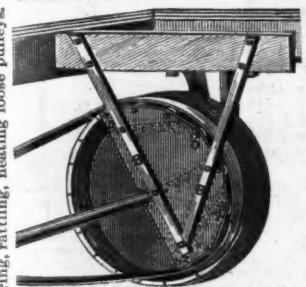


THE WELLINGTON BELT HOLDER



HOLDS THE BELT AT REST when the machine is not in use, and in position to be instantly shifted back upon the driving pulley on line shaft at will. No more wearing, rattling, heating loose pulleys.

No more waste of belts and power when machines are not in use. No more danger shifting belts. Simple, durable, cheap. Agents wanted.

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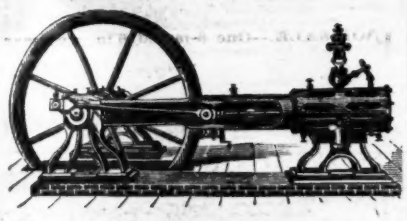

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Cut-off Engine

HAS NO EQUAL AS A FUEL SAVER.

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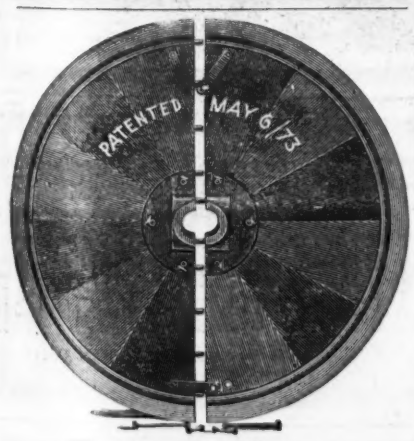
SEND COPY FOR ESTIMATE. IT WILL PAY YOU. CROSSCUP & WEST. 1702 CHESTNUT ST. PHILA. PA.



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MANUFACTURERS of Taper-Sleeve Wood Belt Pulleys, Taper Sleeve and Compression Couplings, Adjustable Dead Pulleys, Wood Pulleys Split or made in Halves, Friction Clutch Pulleys, and Friction Clutch Couplings. You can start a load with this clutch, at any speed, with ease and safety.

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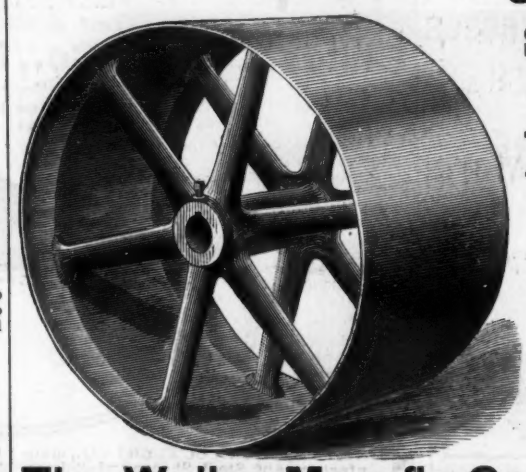

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GEARS
A Specialty.

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With it pipe as large as 6 inches can be threaded or cut to length by one man.

No vise is required to hold the pipe. The bits open when the thread is cut.

The bits are sharpened by simply grinding.

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Specially Designed for the Western Market.

OVEN NO. 8—20x21¼x13 Inches. OVEN NO. 9—22x23¼x14 Inches.

Has peculiar and important features that make it the best operating stove in the market, and commend it to the favorable notice of dealers who desire a first class stove.

It is constructed with our patent flue, which descends in the rear and ascends in front between oven and fire-box, forming a wide flue around back, bottom and front of oven, insuring an easy draft and uniform heating of all parts of oven.

The Reservoir is of planished copper, with deep, stamped pit, protected with cast iron, and is effectually heated without an extra damper. By removing Reservoir and supplying its place with cover plates, a complete six-hole stove is obtained

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A receptacle for the covers, when removed from top of stove, is hung on swing bracket under front hearth.

Its neat design, nicely polished edges, nickeled panel plates and trimmings, give it a very attractive appearance.

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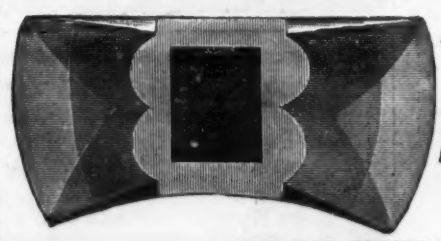

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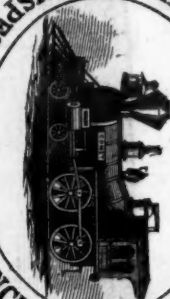

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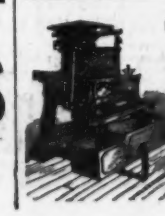
The most simple, durable and economical. It saves from 15 to 25 per cent on labor and fuel.

Send for circulars and price list of Cleaner and Hose. Good, reliable, energetic agents wanted. eow 98



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ALL SIZES.
THE BEST IN THE WORLD!
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DIES AND TOOLS

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THE CELEBRATED XX HEATING STOVE.

Manufactured Exclusively by JOHN RONEY, Hecla Foundry,

Twentieth Street, 12th Ward, Pittsburgh, Penn'a.

XX HEATING STOVE.

	Diam. of Bottom.	Diam. of Fire Chamber.	Height of Stove.	Weight.
No. 5, XX,	26 inches.	18 inches.	40 inches.	180 pounds.
No. 6, XX,	30 inches.	19 inches.	42 inches.	255 pounds.
No. 7, XX,	34 inches.	21½ inches.	48 inches.	380 pounds.
No. 8, XX,	36 inches.	24 inches.	53 inches.	540 pounds.
No. 9, XX,	36 inches.	26½ inches.	57 inches.	800 pounds.

Your attention is called to our CELEBRATED XX HEATING STOVE, which we guarantee is surpassed by none in the market for cheapness, durability, and heating purposes. It has been in the market for the past 16 years and has always given the best of satisfaction, and is particularly adapted for Hotels, School Houses, Churches, large Offices, Machine Shops, R.R. Depots, Round Houses, &c. The dimensions and weights are just as represented. Should you be in need of a large size heating stove we would specially recommend the Nos. 8 and 9.

Write for Prices and Circular of heating and cooking stoves. 15

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Polishers' and Machinists' Supplies, Rub stones, Emery Wheels, Machinery, and Diamond Tools. Send for Circulars to

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The Improved "Climax" Reversible Ice Creeper.

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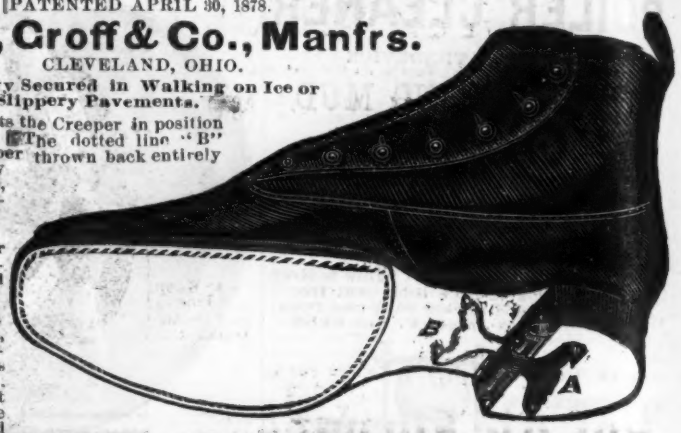
Perfect Safety Secured in Walking on Ice or Slippery Pavements.

"A" represents the Creeper in position ready for use. The dotted line "B" shows the Creeper thrown back entirely out of the way when not in use, or walking in-doors.



This Creeper has advantages over all others.

Its simplicity of construction, being easily adjusted, always ready for use, and when not needed can be instantly turned under the "Shank" out of the way, therefore not interfering with walking in the house on carpets, etc. When in position for walking on ice it is a sure protection from falling.

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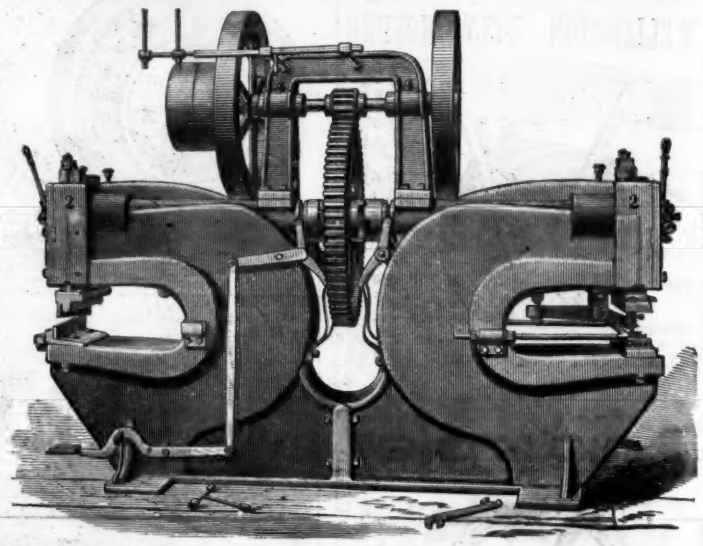
Power Punches, Shears and Hammers.

Adjustable Helve Cushioned Hammers.



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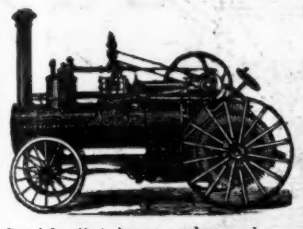

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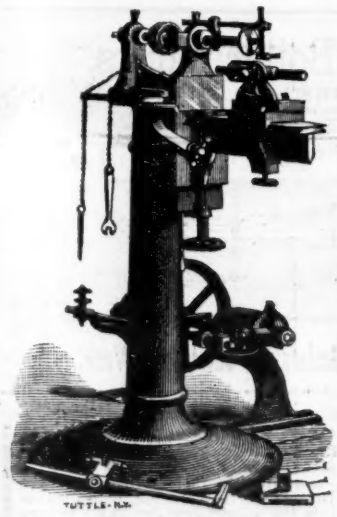

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ROOM 19

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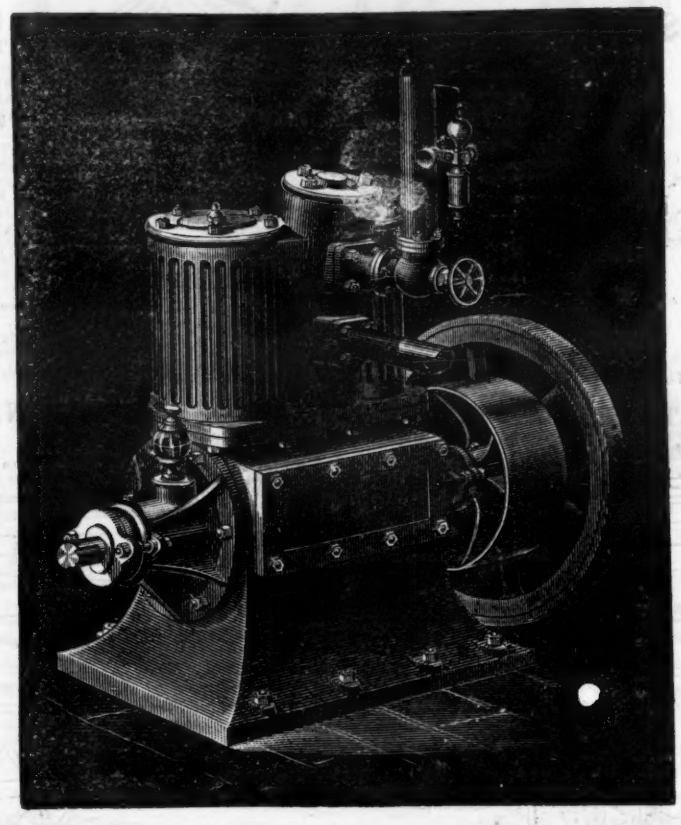
The Westinghouse Automatic Engine.

Rear view, with one Fly Wheel removed.

Average Sales 1,200 H. P. per Month.



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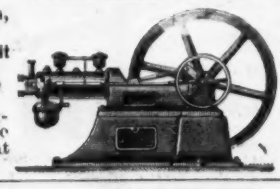
No explosions; no fires nor cinders; no gauges; no pumps; no engineer or other attendant while running. 01



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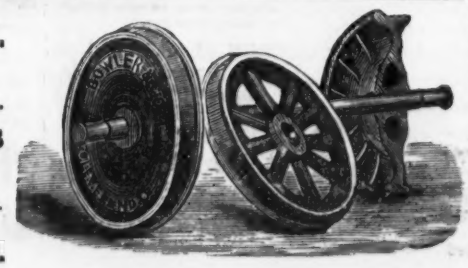

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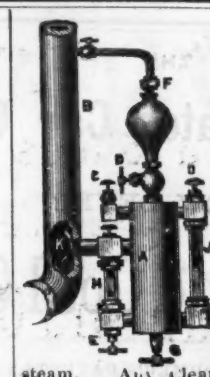

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Office 98 Griswold street, Detroit, Mich.

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And other light Forgings.

Weight 500 pounds.
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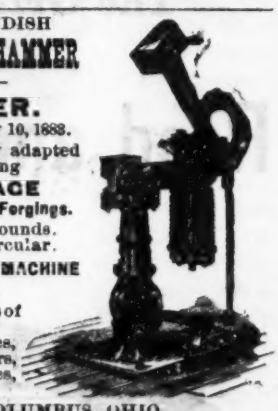

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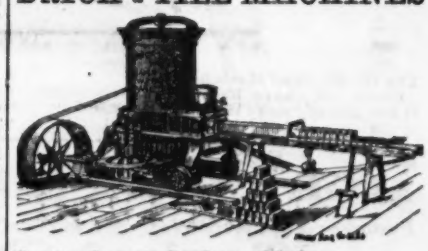

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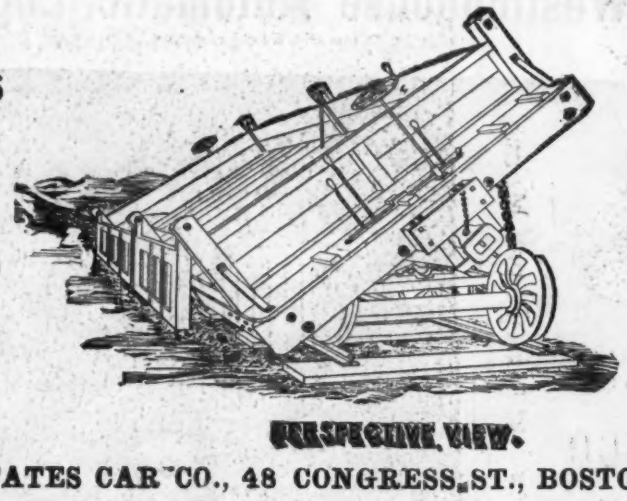

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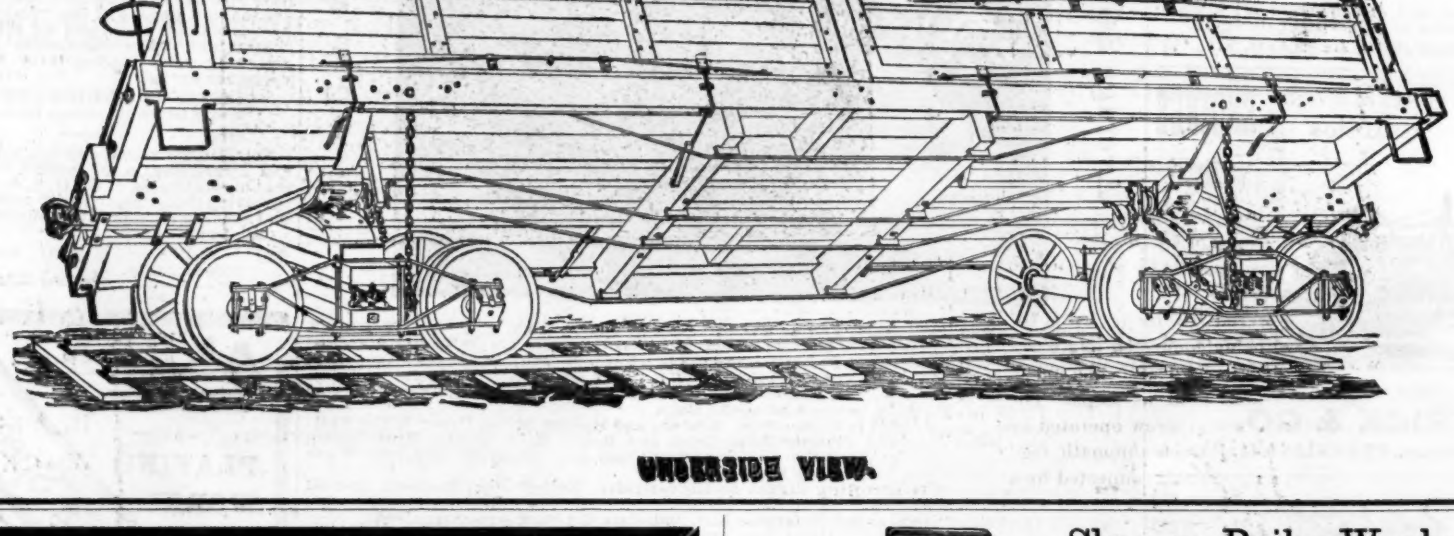

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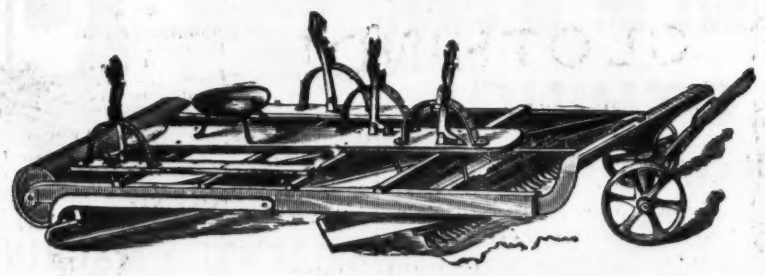

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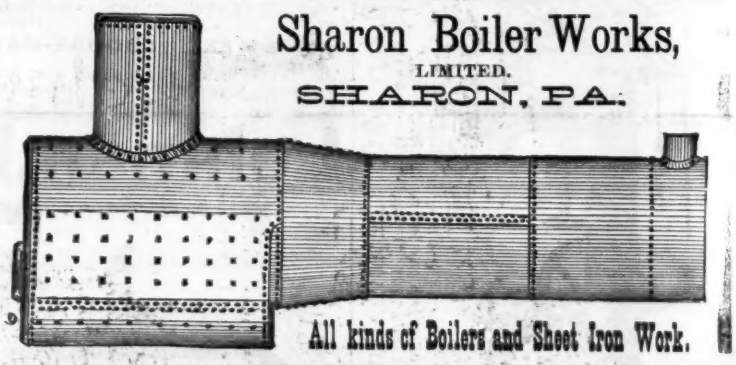

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